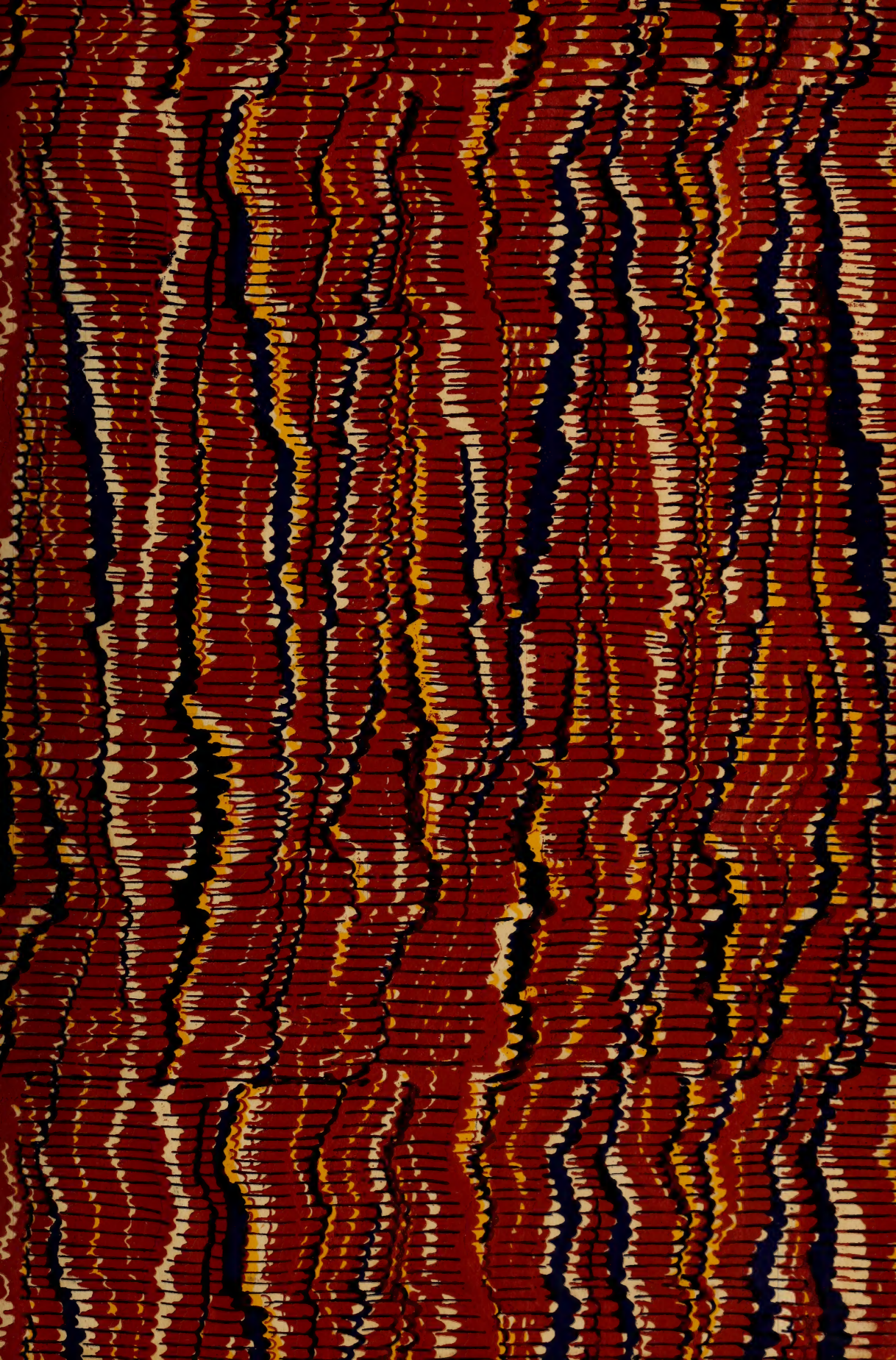

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TO carry out the purposes for which it was founded thirty-four years ago, the National Geographic Society publishes this Magazine. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resultant given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization which was waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the historic expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members through The Society to the Federal Government when the congressional appropriation for the purchase was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people and incorporated into a National Park.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings whose ruins are ranked second to none of ancient times in point of architecture, and whose customs, ceremonies and name have been engulfed in an oblivion more complete than any other people who left traces comparable to theirs.

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THE ISLANDS OF BERMUDA

A British Colony with a Unique Record in Popular Government

By William Howard Taft

Author of "Great Britain's Bread Upon the Waters: Canada and Her Other Daughters," "The Health and Morale of America's Citizen Army," "The Progressive World Struggle of the Jews for Civil Equality," "Washington: Its Beginning, Its Growth, and Its Future," etc., in the National Geographic Magazine

I AM HERE for my annual visit to this Society.* In previous years, which began the year after I left office, I have taken subjects the geographical character of which it was difficult clearly to establish, but this year I shall conform to the proprieties of the occasion. By good luck, Mrs. Taft and I were able to spend four weeks of January last in the Islands of Bermuda, and so delightful was our visit and so interesting was the local suggestion, that I concluded to make the Islands the theme of this year's talk.

The Bermuda Islands are only twenty square miles, about one-fourth the size of Staten Island, but I venture to think that there is no group in any ocean so small which has played so conspicuous a part on the world's stage as the Bermudas. They form a microcosm, the catastrophes, the vicissitudes, the political, economic, and religious controversies, and the development of whose people, as a solitary unit, far out to sea, reflect much of the world history of the English-speaking peoples.

And, first, what are they? and where are they? The answers to these geographical questions will explain much of their history and present condition.

The Bermudas are a group of what are said to be 365 islands (one for every day in the year) in north latitude 32 degrees and west longitude 64 degrees. There are only five important islands, and the whole group are so close together that those capable of use are united by bridges and causeways, so as to give to the sojourner in his drives the impression that they are but one island, with large indenting bays and inlets.

Strung together, they have the form of a fishhook with the stem pointed to the northeast and the curve of the hook to the southwest. From the northeast end to the point of the hook, you can piece out a curving drive 22 or 23 miles long, and the width of land from sea to sea through which you drive will hardly average a mile. The superficial area of the whole group is 19½ miles.

The islands are nearly 600 miles from Cape Hatteras, the nearest mainland; they are 700 miles from Charleston, South Carolina, opposite which they lie in the Atlantic; they are nearly 700 miles from New York and about 50 miles farther from Halifax (see map, page 2).

*An address delivered before the National Geographic Society in Washington in February, 1921.

Drawn by James M. Darley

A MAP OF THE BERMUDA ISLANDS

The outline sketch shows the relation of the archipelago to the Atlantic seaboard of the United States—600 miles from Cape Hatteras and 700 miles from Charleston and New York. The insert map shows the coral reefs which border the fishhook-shaped group of islands on the north, west, and south (see text, pages 1, 2, and 3).

They are about 800 miles from the nearest of the West Indies; they are nearly 300 miles from the southern or southeastern edge of that river of warm water, 100 fathoms deep, flowing over an ocean depth of 2,500 fathoms, from the Gulf of Mexico to New Brunswick, Nova Scotia, and beyond to European shores, which we call the Gulf Stream.

They are irregular hills and ridges of comminuted shells, reaching in some places to a height of 250 feet, drifted and deposited by the wind on the top of a mountainous column of volcanic rock rising from the floor of the sea three miles below. This peak is a solitary one in all that part of the Atlantic Ocean. It has been covered by this æolian limestone and a thinner plaster of coral rock.

After the expedition of H. M. S.

Photograph from S. S. Spurling

A GROUP OF "BOILERS" OFF THE SOUTHERN COAST OF THE BERMUDAS

Reefs of this peculiarly symmetrical form have not been found in any other part of the world. The rims are made up of living crusts of barnacles, mussels, and serpulae which usually rise from one to two feet above low-tide level. They get their name "boiler" from the fact that heavy seas dash against the hard outer rim and fall over into the central area like a cataract.

Challenger on her scientific exploration of the Atlantic Ocean bottom and islands in 1873 had disclosed the lonely column upon which the Bermudas rested, there was an effort to reconcile what seemed a pile of coral rock three miles high in the sea with Darwin's conclusion that the coral animal would not work more than 100 fathoms below the surface.

A desire to find fresh water on the islands led to the sinking of a well 1,200 feet deep, and while it did not bring what was sought, it greatly gratified a lot of puzzled scientific men in disclosing that the coral rock and æolian limestone were a mere cap to what was an old volcano sticking its cratered top up to within less than one thousand feet of the shining surface of the translucent sea.

The top of this subaqueous mountain is much greater in superficial area than that of the visible islands, but it is everywhere crowned with coral and limestone, which protrude in dangerous reefs on the north, west, and south sides of the islands, as far as eight and ten miles from their shores, sometimes peeping above the surface and at others lurking just beneath.

One need not say that such a situation makes Bermuda an awkward place for ships to reach and safely land upon, and this circumstance is an important factor in her history.

Indeed, it makes a danger point in the course of ships coming out of the Gulf, taking advantage of the Gulf Stream, and when opposite to Bermuda changing their course and directing it toward the Canary Islands and the Mediterranean and Europe generally.

IN A SCIENTIFIC WORLD OF ITS OWN

Let me note another characteristic of Bermuda due to her geographical and geological features. Bermuda is all by herself in the scientific and naturalist world. Her soil, which is red, is nothing but the result of the working of the weather on the æolian limestone and coral rock. These islands came from the wind

Photograph by Emil P. Albrecht

ALONG THE SOUTH SHORE OF THE BERMUDAS

The soil of Bermuda is the result of the action of the elements on the æolian limestone and coral rocks.

and drift and currents of the seas. As one writer says: "Probably we could not select a more perfect example of current-formed islands than the Bermudas."

This origin has turned the closest attention of natural scientists to these islands and brought out from them many articles and volumes on the geology, conchology, zoölogy, actinology, arachnology, ichthyology, meteorology, and the flora and fauna of this little punctuation point on the surface of the Atlantic.

While we cannot entirely exclude from the enthusiasm and prolific activity of our scientific men the motive which the charm and bodily comfort of the islands furnished for these expeditions thither, the publications manifest an exceptional interest on their part in this tiny spot on the world's and ocean's surface which the peculiar history of its creation has justified.

Some of the most fruitful sources of the spread of life, animal and vegetable, are wind, current, and birds; and here we have the result of them all in an isolated form, so set apart as to permit the most satisfactory study of their results.

Fish were naturally attracted to such a honeycombed front to the sea as these coral banks make, and their variety, beauty, and flavor are such that the taking of them ought to be a great industry.

Indeed, even the deep-sea monsters gather here apparently to note this obstruction in the wide depths of their domain, and the islands were for a time the center of a whale industry; but the fisheries as a whole have not been developed, though the ichthyology of the group, both in respect of those denizens who inhabit the shallower waters and also the deep sea, has been the subject of many scientific treatises.

The transparent waters, the beauty of the shallow sea bottom near the shore, and the brilliant coloring of many of the fishes make a picture in the mind of even the casual observer not soon forgotten (see Color Plates I to XVI in this number of THE GEOGRAPHIC).

By one of the freaks of the coral shores so frequent here, a small pool has been formed in an island grotto in which several varieties of fish were, perhaps, first imprisoned and others have been added. They have grown in size and

Photograph by Emil P. Albrecht

THE CATHEDRAL ROCKS OF SOMERSET ISLAND, BERMUDA

The sea has washed out quantities of soft rock, leaving these fluted and fretted columns, which support a roof of hard limestone.

number and there they can be seen near at hand and their beauty of color brought out. Their voracity is their most impressive characteristic, and the place is significantly called the "Devil's Hole."

BERMUDA IS AS FREE OF SNAKES AS IS IRELAND

The birds, especially the aquatic species, are numerous, 283 species visiting the islands yearly. Many varieties were much more in evidence when the islands were discovered than now. Their number, their tameness, the great supply of good meat and eggs they furnished, as a source of food, formed one theme of the rosy accounts which were circulated about the islands in the early years of their history. Efforts were made to preserve the most useful, but failed.

There are no more snakes in Bermuda than there are in Ireland. They have a lizard and some varieties of turtle, but that is all of the reptile life.

The turtles must in old times have been of huge size; one, it was said, was large enough to give a good meal from its meat to fifty men, and the eggs and the oil of such monsters were equally useful. There are turtles there still, but they have been discouraged in their expansive ambitions and do not furnish forth a marriage feast as generously as in the dawn of civilization in that little community.

The Bermudas are the land of adopted nativity. They are most hospitable to new varieties of life. Some enterprising grower of plants introduced a toad to take care of the insects which were troubling him in his garden and though this was only in the latter part of the last century, one runs across everywhere frequent evidence of these immigrants of a size startling to one used to a more modest variety at home.

A PLAGUE OF RATS LEAVES A PLAGUE OF CATS

Very early in the settlement, and before 1620, a vessel brought some enterprising rats, which, with enthusiasm worthy of a better cause, multiplied until they ravaged the islands, ate everything

Photograph by Emil P. Albrecht

LOOKING SEAWARD FROM BEHIND THE CATHEDRAL ROCKS
(SEE ALSO ILLUSTRATION ON PAGE 5).

in sight, swam in great multitudes from one island to another, leaving havoc in their train.

Cats were introduced, but to no immediate purpose. Even the fish took part in resisting the rats, and many of the finny tribe were caught with rats in their stomachs. Suddenly they disappeared as they had come and left nothing but a plague of cats, with their night-blooming characteristics, as a reminder of this rodent visitation.

Mark Twain, speaking of this feature of Bermuda, says:

"You may march the country roads in maiden meditation, fancy free, by field or farm, but no dog will plunge out at you from unsuspected gate, with breath-taking surprise, of ferocious bark, notwithstanding it is a Christian land and civilized.

"We saw upwards of a million cats in Bermuda, but the people are very abstemious in the matter of dogs. Two or three nights we prowled the country far and wide, and never once were accosted by a dog. It was a great privilege to visit such a land. The cats were no offense when properly distributed, but when piled they obstructed travel."

The insects are not nearly so numerous or troublesome as in the tropics, but in the summer time the ants and mosquitoes do swarm and are aggressive. Some Bermudians cherish the idea that they have no troubles of this kind.

Mark Twain said: "We had mosquito nets and the Reverend (*i. e.*, his companion) said the mosquitoes persecuted him a good deal. I often heard him slapping and banging at these imaginary creatures with as much zeal as if they had been real. There are no mosquitoes in the Bermudas in May."

BERMUDA SPIDERS ARE TERRIBLE IN SIZE ONLY

The spiders are terrible in size, but beautiful in appearance and innocuous in fact. A fervent scientist writes: "The spiders would give entertainment to any enthusiast for months, for their name is legion." As Mark Twain says of them:

"We saw no bugs or reptiles, and so I was thinking of saying in print, in a general way, that there was none at all; but one night, after I had gone to bed, the

Reverend came into my room carrying something and asked, 'Is this your boot?'

"I said it was, and he said he had just met a spider going off with it. Next morning he stated that just at dawn the same spider raised his window and was coming in to get a shirt, but saw him and fled.

"I inquired, 'Did he get the shirt?' 'No.' 'How did you know it was a shirt he was after?' 'I could see it in his eye.'

"We inquired around, but could hear of no Bermudian spider capable of doing these things. Citizens said their largest spiders could not more than spread their legs over an ordinary saucer, and that they had always been considered honest.

"Here was testimony of a clergyman against the testimony of mere worldlings—interested ones, too. On the whole, I judge it best to lock up my things."

Photograph by Emil P. Albrecht

"KHYBER PASS," A PICTURESQUE ROADWAY CUT THROUGH ONE OF BERMUDA'S LIMESTONE HILLS

Bermuda has some of the world's finest highways, for they are hewn out of solid limestone. The only unfortunate feature is that they are extremely slippery in wet weather.

The flora of the Bermudas is full of beauty for the observer and full of interest for the man of science. Of the trees and plants and shrubs in the islands, 80 per cent inhabit also the West Indies and southern Florida.

SIXTY-ONE SPECIES OF PLANTS PECULIAR TO BERMUDA

Nearly 9 per cent, or 61 species growing in Bermuda or its waters, are endemic and are not known to grow anywhere else in the world. These latter are of great interest to naturalists, as they were presumably developed in Bermuda from related plants formerly existing elsewhere, but now mostly extinct, though some may be found elsewhere later.

As Bermuda is of a late geologic formation, and it had to grow all by itself 600 miles or more from any other place (for there is no evidence at all that it was ever attached to other land), scientists have to explain—indeed, they are keen and delighted to explain—how things did get there to grow. As I have said, they find the explanation in the wind, the currents of the ocean, and the birds.

When scientists find sixty or more species of plants that are not found elsewhere, their appetite for further knowl-

Photograph by Emil P. Albrecht

SAWING STONE FOR HOUSES IN BERMUDA

"One has but to saw a hole in his back yard and take out a house of creamy sandstone and set it up and go to living in it" (see page 26).

edge and their ingenuity and imagination are stimulated to explain how these new plants got there. Their enthusiasm in finding and formulating the problem and their ardor in propounding explanatory theories are only exceeded by their joy over some new discovery which solves the problem and sustains, it may be, some of their theories.

BERMUDA, THE OLEANDER ISLANDS

The glory of the trees, shrubs, and flowers of the Bermudas I need not dwell on. In the landscape, the Bermuda cedar furnishes the prevailing green. It is the most abundant and characteristic tree of Bermuda. It is the Bermudian juniper, with berries which are edible but not nourishing.

There is no good evidence that this tree has grown elsewhere. The wood is soft and easily worked, but fades on exposure. It was used for houses in early days, and then, in the maritime glory of Bermuda, when the laws permitted, it was used to build ships. It is not good for ships of war, as the Bermudians found to their cost, because it splinters too much. It is planted along streets and approaches and can be clipped into arbor arches and hedges. It covers all the hills.

The luxuriance and wealth of color of the flora of the Bermudas have attracted the poets, who have sung their beauties.

The purple Bougainvillea, with its varying shades in and out of the sunlight, is entrancing in its beauty and welcomes one into the grounds of the Government House, climbing over the smoothly cut walls of coral through which the white road makes its way to the home of the Governor.

The oleanders are so fine and so gorgeous in their hues that it has been suggested that these be called the Oleander Islands. Coffee, indigo, cotton, and tobacco are of spontaneous growth.

It may not recall pleasant associations in the minds of the youthful to say that in no place in the world does the castor-oil plant grow more perfectly than here.

The climate of Bermuda has a maximum temperature of about 88°, a minimum of about 48°, and a mean of about

70°. This mild climate assists the growth of esculent plants and roots and promotes early growth of onions, potatoes, carrots, tomatoes, and beetroots, as well as lily bulbs and arrowroot, though the last two have not been successful of late.

As Mark Twain says, "The onion is the pride and joy of Bermuda. . . . In Bermudian metaphor, it stands for perfection — perfection absolute. The Bermudian, weeping over the departed, exhausts praise when he says, 'He was an onion.' The Bermudian, extolling the living hero, bankrupts applause when he says, 'He is an onion.' The Bermudian, setting his son upon the stage of life to do for himself, climaxes all counsel, supplication, admonition, comprehends all ambition, when he says, 'Be an onion.'"

AN UNENVIABLE REPUTATION AS A HURRICANE CENTER

In the three centuries of the history of Bermuda, there are many references to hurricanes and tornadoes; and while, if the record of that long period is analyzed, it may not develop a really frequent recurrence of these ebullitions of nature, Bermuda in her early history secured in the estimate of the world rather an unenviable reputation for being the center of powerful hurricanes.

Sir Walter Raleigh, writing in 1587, speaks of the Bermudas as "a hellish sea for thunder, lightning, and storm." The truth is, Bermuda was born into the history of the world because of the wrecks which were strewn on her dangerous reefs in storms, which blinded the mariners or took them out of their course.

There is something in the discomfort of passengers from New York to Bermuda and return which makes them think that times have not changed since the days of Sir Walter Raleigh.

The islands were discovered by Juan Bermudez, a Spaniard, within less than a quarter of a century after Columbus discovered America. Bermudez could not help discovering them, because he was wrecked on them. A number of hogs he had on board escaped, settled in the islands, and multiplied.

Herrera, a Spaniard, is authority for the visit of Bermudez before 1515 and he it is who gave the islands the name.

Oviedo, a Spanish writer, was with Camelo, who tried to land on the islands in the middle of the sixteenth century, but failed and sailed away.

In 1594 an Englishman named May was on a French ship, the crew of which, after having escaped the Bermudas, as they thought, insisted on getting drunk to celebrate and landed on top of the reefs.

May gives an account of the difficulties they met. He says that the Spanish hogs were there, but they were evidently thinner than the traditional razor-back, for he complains that they had no meat on them. A diet of juniper berries would not seem to make for tenderloin, sides, or bacon.

After five months' stay, May and his companions, who had escaped from the wreck, ultimately made their way in a small boat from the islands to Cape Breton in ten days.

Captain John Smith mentions other wrecks, but these are enough to explain why the Bermudas were called the Isles of Devils.

SIR GEORGE SOMERS WRECKED ON THE ISLANDS

In 1609 came the wreck which really began Bermudian history. Sir George Somers was an admiral and a brave old salt. Sir Thomas Gates was a soldier. They were among the grantees of the charter for Virginia. They embarked in a fleet of seven vessels and two pinnaces, which in this fateful year set sail from England for Jamestown, Virginia, there to feed and reinforce the weak and famishing colony that had established itself two years before.

After sailing in company for a considerable period, they met a furious storm and were separated. The *Sea Venture,* upon which were Somers and Gates, sprung a leak, which constant pumping could not stop.

The Admiral did all that man could do at the helm and in command, but the sea was too much for the vessel. While she was *in extremis,* Somers sighted land and directed the slowly sinking hulk into the rocky banks of Bermuda. She did not sink or break up, because the wind drove her between two rocks, where she stuck

Photograph from S. S. Spurling

PLANTING LILY BULBS IN BERMUDA

The Easter lily industry of the islands was started by the late General Russell Hastings, an American soldier, in the eighties (see also illustration on page 12). For many years the Bermuda growers had a practical monopoly of the onion market also, but recently Texas has proved a most formidable competitor.

fast and from her deck were then safely landed the whole ship's company of 150.

Somers was a man of heroic type. Fuller said of him: "This George Somers was a lamb on the land, so patient that few could anger him, and (as if on entering a ship he had assumed a new nature) a lion at sea, so passionate that few could please him."

They remained in the islands nine months.

Somers and Gates divided the company into two parties, who lived apart, and there was some friction as to authority. Among Somers' men were lazy recalcitrants, who did not wish to do the work and run the risk involved in going on to Virginia. Bermuda was good enough for them, and two of them did hide and remain in the islands.

Each party built a pinnace, and finally, under Somers' leadership, they sailed together, all but the two already mentioned, for Virginia. The pinnaces were 40 feet and 29 feet long, respectively, and in these they set out and reached Jamestown, where they found a famine. Fortunately, a day or two after their arrival, Lord Dela Warre, as Governor, arrived with a cargo of provisions and the colony was saved.

SOMERS DIES ON THE ISLANDS

Somers reported that "the Bermooda is the most plentiful place that I ever came to for ffishe, hogge and fowle." He said further: "These islands have ever been accounted as an enchanted pile of rocks and a desert habitation for devils; but all the fairies of the rocks were but flocks of birds, and all the devils that haunted the woods but heards of swine."

His report suggested to the colonists that it would be a great boon to them if a cargo of these hogs could be brought to Virginia. So Somers, good and brave man as he was, volunteered to go back to the islands for the purpose, and set forth in the pinnace which had brought him to Jamestown.

He reached the islands, but his labors had undermined his health, and he died in Bermuda shortly afterward. His heart was buried there, but his body was taken by his companions, headed by his nephew, to England. A monument was set up to his memory in Bermuda. The islands were named after him in the charter subsequently issued, but the name of the original Spanish discoverer has persisted.

The two men who had remained on the islands while Somers went to Virginia, were able to live there until Somers' return, and when his nephew and the crew took his body home, a third deserted and joined the other two. They soon quarreled and two of them were only prevented from killing each other in a duel by the third's hiding the weapons.

Washington Irving, whose travels took him to Bermuda, celebrates this triumvirate in a short story he called "The Three Kings of Bermuda."

POSSIBLY THE SCENE OF SHAKESPEARE'S "TEMPEST"

Somers was accompanied on these trips by two men, Sil Jourdan and William Strachey, who wrote and published accounts of the storm, the wreck, and of the marvels of the islands.

Jourdan's book was published in England in 1610. William Strachey went to England in that year and settled in Blackfriars, where Shakespeare then was living.

Shakespeare published his play of "The Tempest" some time not later than 1614, probably as early as 1611. Malone, one of the early commentators, became convinced that Shakespeare intended to make the Bermudas the scene of his play, and this view has been accepted by many. Thomas Moore, who lived in Bermuda for a time, assumed it, and Kipling is an enthusiastic supporter of Malone's view and finds a beach in Bermuda where one of the scenes might well have been enacted.

The theory is that Shakespeare read Jourdan's book and account of the storm and talked it over with Strachey, whom he must have known in 1610, because they were close neighbors, and Shakespeare was wont to draw his knowledge from those whom he met in daily life.

Resemblances to the circumstances detailed in Jourdan's and Strachey's accounts of the storm and wreck of the *Sea Venture* are traced in the lines and scenes of the play.

Photograph by Central News Photo Company

A FIELD OF LILIES WITH MORE THAN A MILLION BLOSSOMS OF THE FAMOUS FLOWER THAT IS EMBLEMATIC OF THE EASTER SEASON

The godfather of the Bermuda Easter lily was James Richardson, of Hamilton, who began its cultivation about 1870. It is not as extensively cultivated on the islands as in former days, when as many as 100 flowers were sometimes produced on one stem.

One of the narrators tells of a fire that played along the deck and on the masts and yard of the *Sea Venture* during the overwhelming heavenly artillery of thunder and lightning. This was doubtless an electric phenomenon which the Spaniards called St. Elmo's fire. Ariel the Sprite, in answer to Prospero's inquiry whether he had performed the task to which he had been bidden, says:

"To every article.
I boarded the king's ship; now on the beak,
Now in the waist, the deck, in every cabin
I flam'd amazement: sometimes, I'd divide,
And burn in many places; on the topmast,
The yards and bowsprit, would I flame distinctly,
Then meet, and join."

Ariel saved the whole ship's company, and when asked how he had disposed of the ship and the sailors, he answers:

"Safely in harbour
Is the king's ship; in the deep nook where once
Thou call'dst me up at midnight to fetch dew
From the still vex'd Bermoothes; there she's hid."

Here Shakespeare, it is supposed, followed the details of Strachey's story, and the mention of Bermuda in the Spanish form of the name, it is insisted, confirms the view.

The eagerness to fix a place and give geographical definiteness to Shakespeare's plots is characteristic of many of his commentators. It is less reasonable in respect to the light and beautiful fancy of "The Tempest" than in the case of any other of Shakespeare's plays.

RIVAL ISLANDS IN MEDITERRANEAN

Hunter, while repudiating Bermuda's claim, fixes the scene in Lampedosa, a haunted island in the Mediterranean somewhere near the course which the ship bearing the King of Naples from Tunis to Naples might have taken. It is an island which has a cell and a cave and often has near it the fire of St. Elmo. Another critic scouts Lampedosa as too far to the southeast, but finds another island, named

Pantelaria, in the Mediterranean which he thinks much more likely.

Furness, our own great Shakespearian scholar, the editor of the Variorum edition, rejects the suggestion that the poet intended to make Bermuda the scene of the play. He points out that the mention of "still vex't Bermoothes" by Ariel is in reference to a place *from* which dew was to be brought to Prospero's Isle, and so was different from it. He says: "The islands are called 'still vex't'—that is, *constantly, always vext*—by tempests, from accounts of them which voyagers brought home and which were so unvarying in their character that, as Hunter says, the Bermudas became a commonplace in Shakespeare's time, whenever storms and tempests were the theme."

Photograph by Emil P. Albrecht

"THERE'S NO REST FOR THE WEARY"

It would seem that the "strength" of the famous Bermuda onion is not sufficient to aid this bored young carrier!

Lowell, in his "Among My Books," disposes of the matter in the most satisfactory way. He says:

"Shakespeare is wont to take some familiar story and to lay his scene in some place, the name of which is at least familiar, well knowing the reserve of power that lies in the familiar as a background when things are set in front of it under a new and unexpected light.

"But in 'The Tempest' the scene is laid nowhere, or certainly in no country laid down in any map. Nowhere then? At once nowhere and anywhere, for it is in the soul of man that still vexed island, hung between the upper and the nether world and liable to incursions from both."

FINDING OF AMBERGRIS QUICKENS INTEREST IN BERMUDA

The glowing reports of the historians of the Somers voyages, including Somers himself, in respect to the Bermudas sharpened the interest of the Virginian proprietors in the islands.

Their original charter only gave them jurisdiction over all islands within 100 miles of the mainland, which, of course, excluded the Bermudas. So they soon, in 1612, procured an additional grant, to include all within 300 leagues.

Their business instincts were aroused not only by the reported richness of the islands in hogs and fish and tobacco, and in the abundance of whales in the neighboring waters, but in the finding of a substance called ambergris, which plays a considerable part in the early correspondence between the English owners and the colonists of Bermuda.

Ambergris is literally gray amber. It is a solid fatty, inflammable substance of a dull gray or blackish color, variegated like marble, and possessing a peculiar sweet, earthy odor. It is lighter than water and floats. It accumulates in the liver or intestines of the sperm whale and is thrown off by that animal from time to time in great pieces, which, floating on the surface of the sea, become lodged in the reefs and shores near the habitat of the sea monster.

Photograph by Emil P. Albrecht

A COAL SCHOONER AT HAMILTON, BERMUDA

Bermuda is admirably situated for a coaling station on the trade routes leading to the Panama Canal and to Gulf of Mexico ports, but present facilities are inadequate. Hamilton cannot be converted into a coaling port because its harbor is small and is too far from the open sea, but the same objections do not apply to the land-locked harbor of St. George (see illustration, page 16).

It is found sometimes in chunks weighing all the way from fifty to two hundred pounds. It was then and is still eagerly sought as the basis of perfumery and was once used in pharmacy and as a flavor in cooking. It was so highly prized as to bring several pounds sterling an ounce in the London market.

The instructions of the proprietors to one of the earliest Bermuda Governors show their hopes and fears. They say: "As touchinge the findinge of Ambergreece upon shore which is driven up by every storme where the wind bloweth, we would have you remember that by such as you appointe to that business . . . you may be deceaved of the best and fayrest except you be very carefull in your choice of honest men."

COMPANY OF 120 ADVENTURERS BUY THE ISLANDS

After amplifying the Virginian charter to include the Bermudas, 120 of the Virginia adventurers bought for £2,000 sterling all the rights of the original Virginia proprietors in the Bermudas, and a new company was incorporated by James I in the name of the "Governor and Company of the City of London for the Plantacon of the Somer Islands."

This charter was not granted until 1615, but the purchasers had sent as their representative and Governor one Moore, a carpenter, with fifty settlers, who landed in the islands in July, 1612, to find that "the three kings of Bermuda" had been able to make the islands the scene of great disturbance in their tripartite reign.

The charter gave the islands in fee to the Company. It provided for its organization in London, with a Governor and twenty-four assistants, naming the first Governor and providing for the election of his successor and the discharge of the business of the Company at quarterly meetings.

It gave to the Company the islands, with all fishing, mines and minerals,

pearls, precious stones, and all and singular other commodities, reserving only one-fifth of the gold and silver. It gave to the corporation power to make such laws and ordinances as were not contrary to the laws of England.

It directed that with all convenient speed the islands be divided, that one-quarter of the land be reserved to the Company for defraying public charges, so far as necessary, and that the remaining profits of that one-fourth be allotted to each member according to his holdings. The residue, three-fourths of the islands, were to be divided into eight parts, or tribes, containing fifty shares of twenty-five acres each.

No one man was to own more than ten shares, unless the Company consented, and then not more than fifteen. The people living in Bermuda were to have the rights of British subjects, but the Company was to have the full power to correct, punish, pardon, and govern and rule such subjects. Imports and exports were limited to trade between Bermuda and the Mother Country.

LITTLE CHANGE IN GOVERNMENT THROUGH THE CENTURIES

The first Governor sent out to the colony was Daniel Tucker, gentleman. He had been an early settler in Virginia and was a cousin of the ancestor of that well-known Virginia family.

The Company gave him instructions upon which the government of the colony was framed. Less than in any of the countries of Great Britain has that government been changed today.

The officers of the colony were to be Governor, sheriff, and secretary. There were to be four ministers, one to each two parishes, and land or glebes were to be set aside for each of £100 a year value.

The council of the colony was to be the Governor, the sheriff, the secretary, two of the ministers, two captains of the chief forts, and the first of the overseers of the public land. The Governor and whole council were to sit as judges at general sessions twice a year, and would hear appeals from the Governor and a part of the council who sat and rendered judgments at the assizes.

The Governor was also required to hold every second year a general assembly for the making of laws and orders for the particular necessities and occasions of the islands and the inhabitants thereof, and for the ordering of other important business, which were to be of no further effect when not confirmed by the Company in London.

In the assembly the Governor presided and had a veto. The council were to sit next him, and if they all agreed they might also negative action. Each tribe was to select for its representatives four able persons. These were to have free voices in the assembly and "therein all things were to be established by plurality of voices, the foresaid negatives preserved."

THE BERMUDA ASSEMBLY LASTED 120 YEARS

The first general assembly was held in 1620 and another in 1622. Only one earlier legislative assembly was held in North America, and that was in 1619, in Virginia. The Bermuda Assembly, as constituted in 1622, lasted for about 120 years, and the union of the Governor and the council in the session was regarded as so important that one Christopher Parker, in 1627, was prosecuted as seditious for proposing to make an upper and lower house.

In 1674 the London Company made formal charges against the assembly because the Governor and council sat separately. After that the Governor did not call an assembly for ten years. The appropriation by the Governor of all legislative power for a decade resulted, as did a similar course on the part of Charles I, in the cutting off of the corporate head. By a proceeding in *quo warranto* the Company was ousted of its privileges and the Bermudas became a colony of the Crown, with a continuing assembly.

In 1730 two legislative bodies were created, the Governor and council and the assembly, but the assembly continued to be made up of the four members from each of the eight tribes and four from the common land, or ninth parish, and is so constituted today.

There are two councils today, the executive and legislative councils, with many of the same persons members in both. With these changes, the assembly which sits in Hamilton, Bermuda, today is the

Photograph by N. E. Lusher and Son (from Florence Root-Foster)

ST. GEORGE HARBOR, BERMUDA

This little town, formerly the capital of the islands, is intimately associated with early American history. From its harbor sailed two ships which carried supplies to the starving colony at Jamestown, Virginia, and from its Fort William the American revolutionists obtained a supply of gunpowder which caused the British to evacuate Boston. In the old church is a silver communion service which was presented to Bermuda by William III in 1684.

same body which met in a parish church in St. George three hundred years ago.

There is no people I know in this hemisphere who have shown the same love of the past, the same adherence to the old-time traditions, as the members of this Lilliputian domain, which had its origin in the wrecking of the *Sea Venture* under Sir George Somers. The same tribes exist under same names as prescribed in the charter of James I of 1615.

The survey which fixed the division lines of those tribes was made by an able surveyor, Norwood, before 1620. He divided the island into eight parishes, and in one of the parishes there was an "overplus," as it was called, of nearly 300 acres which Governor Tucker took possession of and on which he built a house. The historian suggests that this incident would have been called a job in modern days.

In 1662, Norwood, the Surveyor, prepared a careful map showing the shares and their ownership, which, as General Lefroy says, are preserved in a well drawn map and constitute the Domesday Book of the islands.

The parishes vary much in population. Some are small in number of people and are much over-represented in the assembly, but the people, though often urged, will not remove the old landmarks.

The history of no other self-governing colony can be so clearly traced as Bermuda, and in the case of none other is its intimate family history of its early days made so familiar. For this we are indebted to the happy circumstance by which the records of the meetings of the Governor and council in the assizes of the general sessions and of the general assembly, which had been for near a century mere bundles of old papers in the custody of the clerk of the council, were examined by General L. H. Lefroy, Governor from 1871 to 1877, and were by him compiled.

General Lefroy supplemented these records with others from the Mother Country and arranged them all in chronological order, with helpful comment and preliminary digest. So successful was he in his work that the staid Assembly of Bermuda assumed the heavy expense of publishing the two large volumes.

Of course, the records are somewhat fragmentary, but they are sufficiently full to bring one close to the life of this island community, and to enable us to note their customs, their ambitions, their quarrels, their religion, their failings, their vices, their methods of government, and their curious administration of justice.

I have said that the general assembly and the councils have changed but little since they began, three hundred years ago. The great change has been in the establishment of a separate court.

GOVERNOR ONCE COMBINED EXECUTIVE, LEGISLATIVE, AND JUDICIAL DUTIES

In the early days the Governor seemed to unite in his person legislative, executive, and judicial duties. He presided over the assembly, took part in its deliberations, voted on measures, and vetoed them. As Governor, he executed the laws and regulations he helped to make. Under the English constitution, in the royal courts, the judges were appointed by the king and acted for him.

The king might sit in the court with them, but in fact he never did. In Bermuda the theory by which the courts were acting in the name of the executive and for him was realized in fact; so that, with his council, he administered justice. Sitting with a somewhat larger council in general session, he acted as a court of error.

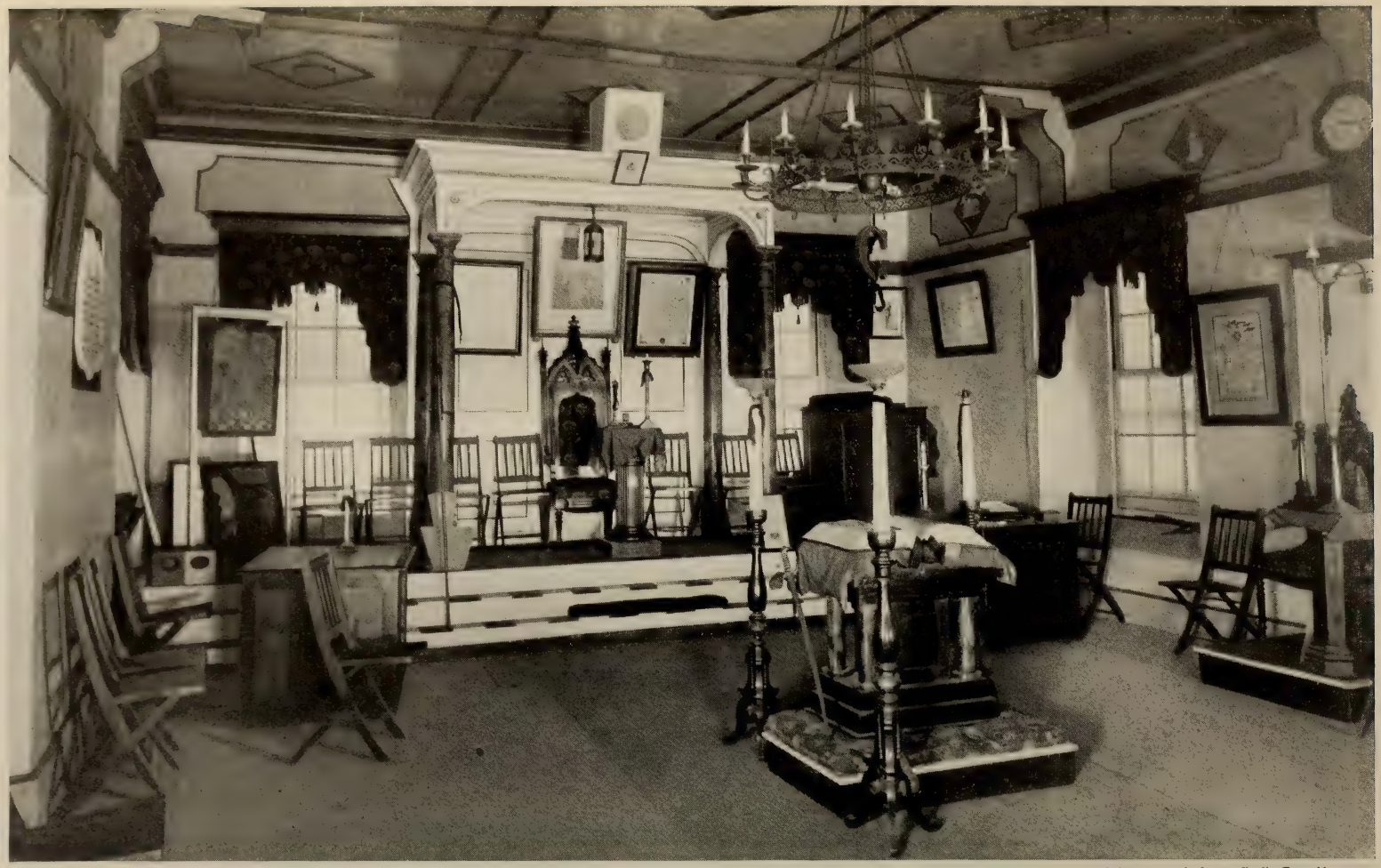
Even after separate courts were established, the Governor and the council continued to act as a court of equity and to be a supreme court of error.

Now properly much of this has been abolished by the establishment of the Supreme Court, presided over by a Chief Justice appointed by the Crown of Great Britain. This Chief Justice is a member of the legislative council, and so in separate body acts in a legislative capacity as well.

The Supreme Court exercises jurisdiction both at law and equity, and there are in certain cases appeals to the judicial committee of the privy council.

I asked the Chief Justice in respect to this appellate jurisdiction of the privy council, and he said that in his term of some years no appeal had ever been taken and perfected. And he could not remember one in the island history.

In spite of the fact that the forms of government have been but slightly changed in Bermuda, the spirit of con-



Photograph from S. S. Spurling

WITCHES WERE ONCE TRIED AND CONDEMNED TO DEATH IN THIS ROOM, NOW USED BY A MASONIC LODGE: BERMUDA

This was the old State House at St. George, built before 1620 and used for the meetings of the legislature and courts of justice until 1797, when the capital was transferred to Hamilton. Executions for offenses that today would be considered trifling were carried out in front of its doors. A record in this building shows the execution of one Joseph Jones for stealing a pair of artilleryman's socks.

tention between the Governor and council, on the one side, and the assembly, on the other, has greatly improved.

STUDY IN POPULAR GOVERNMENT

The power of the assembly, which in the beginning, as indeed in the beginning of most popular governments, is only a petitioning and advisory body seeking action by the executive, who draws all power to himself, acquired an independence and power in the making of laws and the appropriation of the people's money which gives it really a very different character from what it had in the beginning; and these changes it is interesting to study in Bermuda, because they furnish a typical illustration of the growth of popular power through the assertion by the Anglo-Saxon of his self-conceived rights.

The franchise in the island was not given to the residents, but only to the owners of shares into which the tribes and the commons were divided, so that the electorate was very much smaller than the male residents. Indeed, even now, as I recollect it, in a population of some 20,000, there are not more than 1,250 electors.

For a man to be an elector he must have property which is assessed as worth at least 60 pounds a year, and this requirement was doubled from 30 pounds a year when slavery was abolished, in 1834. In other words, we must realize, in calling that of Bermuda a popular government, that it is a government of landed holders and not of manhood electors; that this fact has had a marked effect upon certain conditions which now exist in the islands, to which I shall refer later, and that it is retained as one of the strongest indications of the deeply conservative character of the Bermuda community.

The history of the Colony of Bermuda from 1620, when the first assembly met, until 1684 or 1685, when the Company was ousted of its charter by *quo warranto* in the King's Bench in England, is made up of the struggles of the Company in London to make as much out of the colonists as possible; of the struggles of the colonists to remove the restrictions on trade with others than the Company, imposed upon them by the proprietaries, and of the efforts of governors sent out to the islands to maintain order, enforce the rules of the Company, and defend their authority and exercise too-often arbitrary power.

In the beginning the proprietaries were greatly misled as to the wealth of the islands and their resources. They counted on substantial income from the finding of ambergris already described. It is the rare finding of this anywhere that gives it so great a value, and the Bermudas were no exception in this regard.

Another source of revenue to which the island Company looked was that which came to be made from wrecks upon the islands. The early history of the islands gave ground for much ghoulish hope. The Company, therefore, reserved to it forever the moiety of all lawful wrecks and the remaining moiety was given to the recoverers. If the wreck was driven on to a man's property, then the recoverer and the owner were to share the moiety.

There is an amusing story of the wrecking of a vessel on the islands upon a Sunday. The news of it leaked into the congregation, situated near where the vessel seemed likely to strike and break.

The minister, who heard the news, rose and implored his congregation not to leave during the service, but to wait until he concluded, when all might start even.

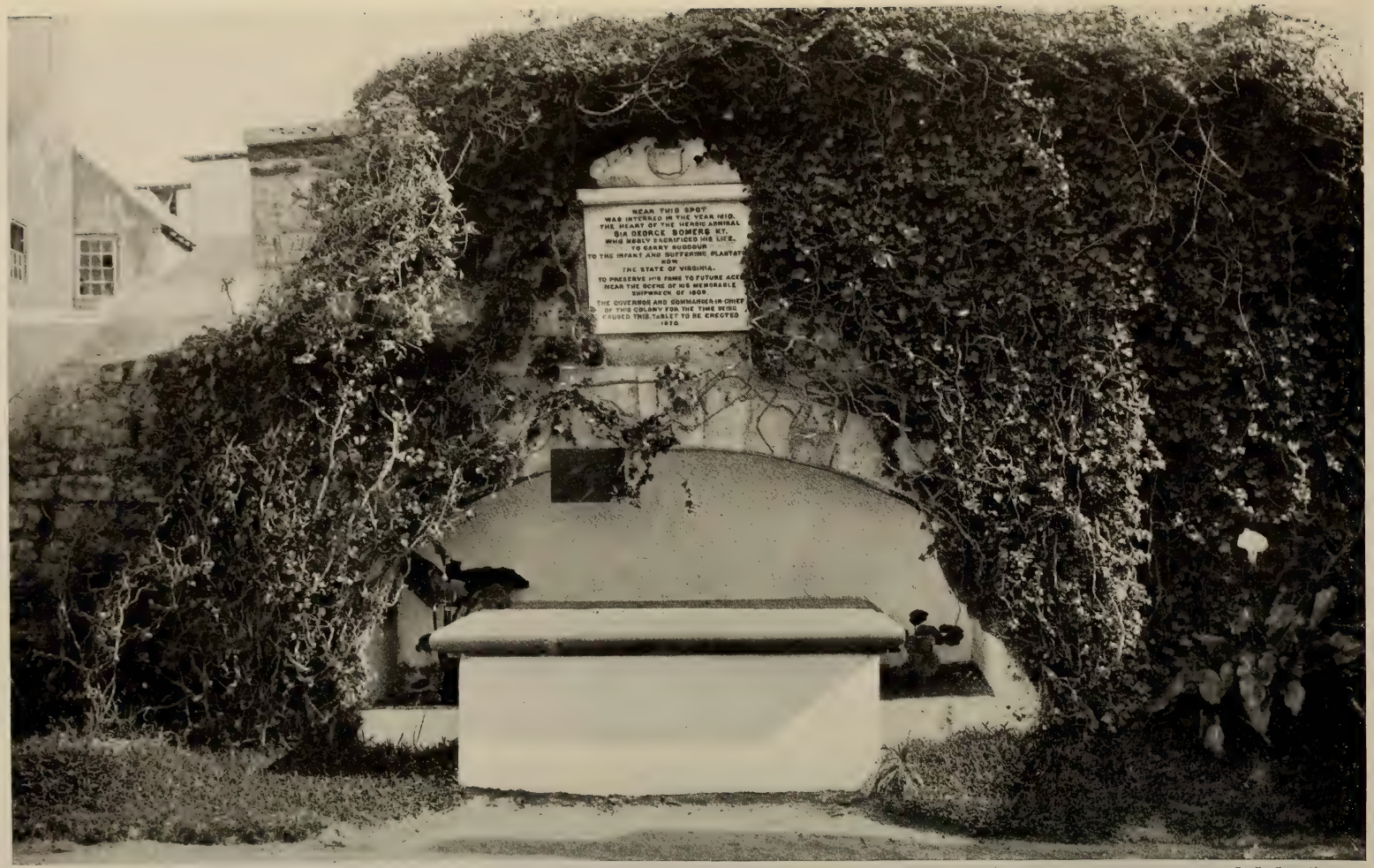
The complaints show that the Company had great difficulty in collecting its half of the plunder. The Company expected profit by the whale fisheries, but whale fishing is not free from danger and hard work, and the restrictions put upon it and the license required to engage in it discouraged that pursuit.

TOBACCO CHIEF PRODUCT OF EARLY DAYS

The chief agricultural product of the colony, as indeed of Virginia, in early days was tobacco, and for a time the Company, by compelling a sale of it at a low price, was able to realize a somewhat handsome profit.

But, as was natural, the colonists, knowing that the tobacco which they raised was worth so much more than the price paid, were negligent in its cultivation and in its curing and packing.

The communications of the Company are full of complaints on this score. In the early part of the 18th century the


NEAR THIS SPOT
WAS INTERRED IN THE YEAR 1610
THE HEART OF THE HEROIC ADMIRAL
SIR GEORGE SOMERS KT.
WHO WISELY SACRIFICED HIS LIFE
TO SAVE BUDDOUR
TO THE INFANT AND SUFFERING PLANTATION
NOW
THE STATE OF VIRGINIA.
TO PRESERVE HIS FAME TO FUTURE AGES
NEAR THE SCENE OF HIS MEMORABLE
SHIPWRECK OF 1609
THE GOVERNOR AND COMMANDER-IN-CHIEF
OF THIS COLONY FOR THE TIME BEING
CAUSED THIS TABLET TO BE ERECTED
1810

Photograph from S. S. Spurling

THE TOMB OF ADMIRAL SIR GEORGE SOMERS: ST. GEORGE, BERMUDA

While the Bermudas were discovered before 1515, by Juan Bermudez, a Spaniard, their history really dates from 1609, when the British Admiral Somers, in the *Sea Venture*, was wrecked here (see text, page 9). Admiral Somers' body was removed to England for burial, but his heart, appropriately, was left in Bermuda.

growing and curing of tobacco was largely given up.

It may be said for the Company that it seemed very anxious that the colonists should have religious instruction, and that their children should have education, so far as their declarations can be credited; but the grievances of the colonists included frequent complaints that they had not ministers of religion enough, and they used this to meet the charges of the Company as to the prevalence of drunkenness, idleness, incontinence, and general immoral tendencies.

There were very few governors whose administration of the regular three years' term or longer was not full of discussion and conflict of authority. Few governors went out of office against whom some suits at law for abuse of authority and false imprisonment were not brought as a reward of their administration.

In the days of the Company, the governors used questionable authority to punish the slightest infraction of what they regarded as proper rules of conduct.

Governor Tucker, sitting as the head of the assizes and in the general session, did not hesitate to sentence a man and execute him for having made a speech against him and his government.

The controversies continued, but the people held tenaciously to their rights, and the recognition of the power of the assembly grew more and more apparent as the years wore on. The men who took part in these controversies were chiefly the descendants of those who had figured in the same discussions since 1620.

The merchants, wholesale and retail, the farmers, and all the business men today have still among them, as influential leaders, the descendants of those who were prominent during the thirty decades since Daniel Tucker assumed authority as Governor under the charter of James I.

It is interesting and curious to note the minute supervision that the court of assize, sitting as a kind of grand jury and court as well, exercised over the lives of the colonists.

In the assize and session of 1618 we find a widow presented by name on suspicion of incontinence; William Pollard, gentleman, for that he doth not forbear to use himself unreverently in the church and, contrary to religion and the discipline of the Church of England, hath refused or neglected to receive the Holy Communion; certain churchwardens for not providing communion wine; a married couple for not living together according to the ordinance of God; two men for playing unlawful games, and other such like disorders.

These presentments, as General Lefroy says, were no laughing matter, for thirty lashes at the church door frequently followed.

THE CLERGY AND THE GOVERNOR WERE OFTEN AT ODDS

Some of the ministers who were sent were graduates of Cambridge and Oxford and were vested with considerable authority, and at times did not hesitate to differ with the Governor.

The Governor did not, on his part, hesitate sometimes to imprison them, and when he left office he usually found a suit for false imprisonment as one of his rewards. So common was this that the assembly passed an act in behalf of ministers, providing that all of those sent home or imprisoned by the Governor should be entitled to their pay *in interim,* unless justly proceeded against.

One of the great complaints which the colonists had to make was of the necessity for buying their supplies from the stock furnished by the Company, and out of this the Company doubtless made substantial profit.

The number of colonists had reached 2,000 in 1629, and although there were variations from time to time, there has been a gradual increase, until now there are about 20,000 people.

A number of those who owned shares in the Company came over to join them in the colony, and the English noblemen who were among the 120 proprietaries parted with their interests.

From time to time complaint was made of the character of the colonists who were sent there. They were taken from the jails and bridewells, and did not add to the morality or economic strength of the community. One very energetic Governor named Butler procured a resolution protesting against "the overaged, diseased, and impotent persons who were being sent over to us, and so are to rest and remain here as drones and horse-leaches,

Photograph from S. S. Spurling

A FISHERMAN'S LUCK IN BERMUDA

Bermuda fishermen enjoy much the same advantages as do those off the Florida coast (see "Certain Citizens of the Warm Sea," pages 27 to 62).

living upon the sweat and blood of other men. No greater canker can there be to a new settled plantation than the stuffing it with idle and unprofitable persons, whose bellies for the most part are extraordinarily craving and their mouths ravenous."

If a man in bravery of apparel exceeded his degree, and if after admonition he did not reform the same, he was in respect of all public burdens to bear the double to any other, and was declared infamous.

In the class of infamous persons were those who were idlers after admonition; who were vagrants; who were drunkards or common haunters of tippling-houses; who were common spenders of their time in dicing, carding, or other kinds of unlawful gaming; who were common raisers of quarrels among neighbors. When infamous they were incapable of holding office, and they were not permitted to sit or stand in church with the rest of the congregation, but in a lower place by themselves, in the meanest place everywhere.

The records are full of convictions of persons who, having spoken contemptuously of a governor or minister, were imprisoned and only released after serving a time, upon signing a confession and repentance.

In 1669 Governor Haydon issued the following to his provost marshal:

"7 MARCH, 1669.

"To Mr. JOHN BRISTOWE, JUN'R,
Provost Marshal.
By Sir John Heydon:

"Whereas Wm. Deane of St. George's Mariner hath bin a man of deboshed life and conversation, more especially since his marriage, and hath bin admonished by Magistrates to reform, and yet notwithstanding favour formelie shewed him, hee hath not seased to tell his neighbor (videlicet) Mistress Katherine Shaw that he did not care a —— for her nor for Mr. Samuel Smith (the minister) neither and bid her goe and tell him soe; with addition of many other reprochful languages unto her the said Katharine, for noe other cause, then only that shee came to his house upon her hearing of him notoriously abusing and beating his own wife as formerly he hath done. These are therefore to require and authorize you forthwithe to take the said William Deane, and him whip, or cause to be whipped uppon

the nacked bach with thirtie stripes. Whereof fayle you not, and for your so doing this my warrant shall be your discharge. Given under my hand the 7th day of Sept. 1669.

JOHN HEYDON."

CHANGES IN MOTHER COUNTRY QUICKLY REFLECTED IN BERMUDA

The change from the Company's control to the control of the Crown did not relieve the Bermudian community of dissension and discussion between the governors and the assembly.

There were reflected in the life of the colonial community the political, religious, and social conflicts of the Mother Country and the other colonies.

The controversy between Charles I and his parliament brought about a division in the islands, but after one or two years the prevailing government in England was fully recognized in the islands. So, too, the fights between the Church of England and the Independents and the Presbyterians arose, religious prosecutions and persecutions were maintained and fought, and the Church of England went out with Cromwell and returned with Charles II.

The prosecutions for witchcraft had their vogue. There were 20 presentments and five were hanged.

The Quakers sought the islands, and were persecuted and made defense. They did not seem to have been as violent in their demonstrations and in their interference with public worship as elsewhere, and none were given more than mild punishment, though some foreign Quakers were banished.

Slaves were introduced into the islands as early as 1632, and slavery continued to be an important institution in the social and economic life of the islands until its abolition, in 1834. For a time the industry of the islands was agricultural, the cultivation of tobacco, and slaves were an important aid in it.

The refusal of the Company to allow the use of the cedar trees as timber for the construction of ships prevented maritime pursuits. In the 18th century, however, as a result of a change to the direct government of the Crown, the restrictions on the use of lumber were removed, and for a considerable period the Burmudians abandoned agriculture and devoted themselves most successfully to the carrying trade between the American colonies and the West Indies.

In that time agriculture was confined to the negroes and became a despised pursuit. Because of this, from time to time there was famine in the islands, which could only be relieved by illicit trade, contrary to law, with the American colonies.

It was during one of these periods of famine and suffering among the Bermudian colonists that the Revolutionary War broke out in the United States. Washington was in desperate straits on account of a lack of powder, and a vessel from Philadelphia went to Bermuda and, with the connivance of the colonists, for it could not otherwise have been done, broke open the powder magazine and took the entire supply aboard the ship and conveyed it to Philadelphia.

This was during the incumbency of Governor Bruere, who was at sword's point with the assembly and the colonists. He immediately and rightly charged that the achievement was due to the treachery of the inhabitants.

ONCE AS FORMIDABLE AS GIBRALTAR

The importance of Bermuda to the Mother Country has been as a British fortress and naval station. Protected from attack by the outlying reefs, and with its strategic advantage in respect of the West Indies, Great Britain has spent a great deal of money in the past in establishing a naval station, in fortifying the port, and in building quarters for an army garrison. During this period of preparation there were sent to the islands, 9,000 long-term convicts to work upon the docks and the naval station and to build roads through the islands. The evidences of this work of engineering construction meet the visitor on every side.

Bermuda was at one time considered as formidable as Gibraltar; but what the result of naval long-range artillery would be in an attack upon the islands I am not military expert enough to judge. Certain it is now that the importance of the islands as a military garrison is not made apparent. There are but few troops there and still fewer ships.

It is gratifying to know that here, as elsewhere, Great Britain refuses to con-

Photograph by Emil P. Albrecht

A WRECK OFF THE BERMUDA SHORES

Much of the history of the Bermudas has been born of shipwrecks. Sir Walter Raleigh referred to the waters in the vicinity of the islands as "a hellish sea of thunder, lightning, and storms," and many commentators believe that this was the scene of Shakespeare's "The Tempest."

sider the possibility of conflict with the United States; and while she continues to send some of her best soldiers and sailors, the one to be governors and the other to be admirals, in charge at these headquarters of the North American station, it is perfectly evident that the proximity of Bermuda to the United States has little or no bearing on British policy in this colony.

The fact, however, that Great Britain did spend a great deal of money in preparing Bermuda as a fortress had marked influence upon the economical fortunes of the islands, and has enabled the islanders to secure a system of beautiful roads and extensive public works impossible otherwise.

When the trade between the United States and the West Indies became free, some little time after the War of 1812, the Bermudian mariners could not meet the competition of our sailing ships and those of the Mother Country, and the islands were driven again to agriculture.

THE REAL WEALTH OF BERMUDA—EARLY VEGETABLES

Under a British general, who was Governor, General Reid, in 1840, great progress was made in developing what is the real wealth of the islands, their adaptability to the raising for the markets of the United States early vegetables. The Bermuda potato and the Bermuda onion have attained a just reputation for excellence in those markets, where a high price can be obtained for them as one of the luxuries of the table.

The effect of the abolition of slavery was not so marked in the islands as with us. It was a peaceful change, and while every family in the islands had slaves, they were rather domestic servants, few in number for each family, and not large groups, as with us, engaged on large plantations; and, while some years before Bermuda slave owners manifested great opposition to the anti-slavery movement, on the whole they were quite well satisfied to have the change made, accompanied, as it was, by the payment to them in round numbers of $600,000 for the six thousand slaves whom they held.

While the system of education in the islands is lacking much in thoroughness and should be greatly improved, there are enough schools to give to all of the negroes who seem to have a desire for education primary instruction.

With thirty years' start upon our own negroes in the matter of freedom, and without the bitterness created by a war whose cause was slavery, the Bermuda negroes have on the whole made more progress than our own colored people and seem more contented, though not more progressive.

ONE MAN MAY HAVE SEVERAL VOTES

No man can be a member of the assembly unless he possesses a freehold rated at $1,200, just as one who votes for him must own a freehold rated at $300 annually. A freeholder may have several votes—that is, he may vote in each parish in which he owns enough to constitute himself a voter.

In 1908 there were only 1,298 electors, and of these 852 white and 446 were colored, although the population was two colored men for every white man.

The result of these restrictions on the franchise and character of the representatives is that there are now in the legislative assembly but two colored men. As already said, these provisions make the islands a representative government of the landed owners.

The beauties of this island home, its fine climate and scenery, its convenience of access from the United States, its efficient government, attract from the United States a large number of visitors during the colder and uncomfortable seasons of the year. Indeed, in time past there have been as many sojourners in the islands from the United States as there were permanent residents.

The payments of these visitors, together with the value of the exports of early vegetables, are the sources of the income of the islands. Their revenues for the maintenance of the government they derive from an *ad valorem* duty of 11 per cent. This enables them to carry on the government and to maintain its dignity and the forms that, with their conservative tendencies, they love to maintain.

The land-owners pay no general tax on their land or property. No man is compelled to pay an income tax, for the income tax levied by Great Britain does not

apply to British subjects beyond the British Isles. There are some small parish dues which the land-owners pay, but they are insignificant. Nowhere in the world, I venture to think, are the taxes lighter than in the islands.

Under these circumstances, with the government as it is and the control where it is, we are not likely to see a change.

The people one meets there as a visitor are agreeable ladies and gentlemen, of cultivation and refinement. They keep abreast of the times, but they are content with what they have. Trollope, who visited the islands in 1858, was not very gracious to them, but one thing he said of them has much truth in it:

"To live and die would seem to be enough for them; to live and die as their fathers and mothers did before them, in the same houses, using the same furniture, nurtured on the same food, and enjoying the same immunity from the dangers of excitement."

The beauty of the island scenery and its unique character need but a word. The prevailing background in every landscape is the green Bermudian cedar, or juniper tree, and dotted in this general background are the white houses of the cities and the country.

The beautiful roads add to the dazzling white of the picture. They are made of coral rock, which packs and cements itself. Mark Twain said that, after thinking over what it reminded him of, he hit upon exactly the right description of its color and effect when he called it icing on a cake.

The roads are not wide enough and the curves are too sudden for automobiles. The chief objection to them is their slipping character after the frequent rains. Horses frequently fall on a down grade.

The cities, Hamilton and St. George, are not large, and the population is well distributed through the islands. In most countries the population of 1,000 to a square mile is thought to be fairly concentrated, and that we have here.

In the early days the colonists lived in houses built of cedar. Now they live in houses built of coral rock. It is usually cut on the premises. As Howell says:

"What will be said to you when you tell that in the Summer Islands one has but to saw a hole in his back yard and take out a house of creamy sandstone and set it up and go to living in it?"

There are two things in the islands that determine much of social economy: One is the presence of this building material, which can be sawed out with a hand-saw and after some exposure is ready for use (see illustration, page 8), and the other is the total absence of wells.

It is necessary to get all drinking water from the clouds, and that, as a measure of health, requires that every roof from which the water is to be derived should be kept clean by whitewash.

The palace of the rich man and the hovel of the poor man are equally white, equally substantial looking, and equally clean; and this circumstance furnishes singular superficial evidence of the fairly equal distribution of wealth and comfort in this little community.

LESSONS IN THE PURSUIT OF HAPPINESS

From the happiness that seems to prevail, from the philosophic contentment with which the people of these islands look out upon the rest of the world, we may derive many lessons with respect to our pursuit of happiness, which the Declaration of Independence postulates as one of our rights.

Notwithstanding the close business relations between the United States and the people of Bermuda, they are English in their traditions, their descent, and their sympathies. They were the center of the blockade-running during the Civil War, and their prominent people made a great deal of money out of that industry; and while in the result they lost much of what they had gained, their attitude of mind continues to be one of attachment toward the Mother Country. It fits into all their traditions, and, as I have indicated, traditions with them are as binding as steel.

The suggestion, therefore, that has been made by some of our public men, that we might buy the West Indian possessions of Great Britain, including Bermuda, in part settlement of the war debt which Great Britain owes us, has been made without knowing at all the temper and feeling of Bermudians in respect to such a severance.

Great Britain would not think of giving up the islands, and the Bermudians would not think of being given up.

CERTAIN CITIZENS OF THE WARM SEA

By Louis L. Mowbray

Director, Miami Aquarium and Biological Laboratory

EVEN man's most terrific wars against his fellows have a respite; they are but cataclysms in the normal course of the world; but the battle of fish against fish—furious, quarterless, to the death—is everlasting. So, within the warm balmy waters of the Gulf Stream off the Florida coast, where the lazy waves of the surface seem to typify peace, the never-ending Armageddon of the finny world rises to its highest pitch.

It is almost impossible for the human mind to conceive the continuous struggle for existence that in these warm seas goes on beneath the surface of the water. If such conditions existed on land and the resultant mental strain were not provided for by Nature, few would survive the constant tension upon the nervous system.

A fish starting in pursuit of another frequently attracts the attention of one of a larger species and is in turn pursued. Often, in southern waters, when an angler hooks a fish, and before it can be drawn into the boat, it is cut in two by the jaws of a larger enemy; for most carnivorous fish seem instantly to sense prey when one of their number is in trouble, and a blood lust becomes epidemic forthwith.

Even in the face of this ceaseless struggle, the waters of the warm seas teem with fish, reptiles, crustaceans, and other creatures. There Nature both pours forth and destroys life with unsparing hands. That species may survive, and even prosper, though surrounded by implacable enemies, she has given all creatures of these waters the power to reproduce themselves an almost unbelievable number of times.

OBSERVATIONS OF MORE NORTHERLY FISH

A single female fish, during the spawning period, holds potential life in numbers running into millions. It is estimated that a 6-pound mackerel produces 1,500,000 eggs at one time; a cod weighing 21 pounds, it has been computed, produces 2,700,000 eggs, and a 77-pound cod, 9,100,000; and a close scientific study and research show that a 13-pound pollock, of the cod family, produces over 2,569,000 eggs, and a 23½-pound pollock over 4,000,000 at one spawning.

THE SURVIVAL OF THE FITTEST

There is no better way to realize the keenness of the sea battle for existence than to picture the result if in the sea the lion should lie down with the lamb!

It is not difficult to imagine what would happen if these staggering numbers of eggs were not interfered with by enemies, if all the young hatched out were safe from violent death, and if the young females in turn soon began contributing their millions of eggs. The operation of this tremendous geometrical progression would in a few years fill every cubic foot of the seas, vast as they are, with living creatures; the oceans would be unnavigable—a compact mass of animal life.

The battle of the seas, then—the unending strife, the seemingly heartless preying of one creature upon another—has its definite need in the world's economy.

The strife of the seas takes many forms. Fishes that feed in shoals have a well-planned method for acquiring their living food, and the same procedure is carried out so often that it resembles the workings of an exceptionally well-trained body of soldiers.

When a shoal of smaller fish is located near the shore, the larger fishes encircle the shoal, herding it to an almost compact mass, occasionally darting into it and getting a mouthful. Sometimes they do not strike the shoal, but continue driving it as bait until somewhat larger fishes attack it. The great fish then proceed to feed upon those which have been lured by the original prey.

During the mêlée the surface water is lashed into foam, often for an area exceeding a mile, and the little fellows are jumping every way in their mad efforts to escape their enemies.

Photograph by A. W. and Julian A. Dimock

A TARPON DOING A FIN SPRING

Photograph by A. W. and Julian A. Dimock

THE FISH OR THE FISHERMAN?

This remarkable photograph, taken by Messrs. A. W. and Julian A. Dimock, shows the masterly fight put up by a hundred-pound tarpon. These huge fighters now and then leap into the boat in their endeavor to shake the hooks from their mouths.

Photograph by A. W. and Julian A. Dimock

TARPON LEAPING

This great fish, the "Silver King," dear to the heart of all sportsmen, was caught by the camera in the very act of shaking the hook from its mouth.

Then from the air above comes another menace to the safety of the panic-stricken legions. The seagulls, man-o'-war birds, and pelicans dart upon them as they break the surface in their mad efforts to escape the dangers of the sea.

It is possible to locate a shoal of small fishes by watching the birds which feed from the sea. These fly over the shoal, waiting for the inevitable attack of the larger fishes to drive the food they seek to a point of vantage near the surface of the water.

NATURE'S PROTECTION AND REGULATION

In addition to sheltering nearly every species of sea creature under the laws of chance by providing extreme prolificness, Nature has not failed to furnish other protective measures to offset somewhat the dangers that everywhere threaten to eliminate whole species.

Numerous cases are recorded where a certain kind of fish has been almost obliterated and for long stretches of time has been thought to be extinct, but in some manner a sufficient number of individuals of the species remained to find protecting shelter where they might live and propagate their kind.

THE SUPPOSED PASSING OF THE TILEFISH*

One case is that of the tilefish, of which much has been written. In the year 1882 vessels arriving in Philadelphia, New York, and Boston reported having passed through miles of dead fish of this species. From the various accounts, it was estimated that an area of from 5,000 to 7,500 square miles was thickly strewn with the dead and dying creatures. The number of fish in this area was computed to be in excess of 1,000,000,000.

Various reasons were advanced for this gigantic tragedy, the most plausible being that a very sudden drop in temperature along the northern edge of the Gulf Stream proved fatal to these warm-water fish. It seemed for several years that the species was almost totally wiped out, but recently tilefish have been rediscovered in great numbers in their former habitat.

* See "America's Surpassing Fisheries," by Hugh M. Smith, U. S. Commissioner of Fisheries, in the NATIONAL GEOGRAPHIC MAGAZINE, June, 1916.

It is not known where they retired until their numbers became strengthened, but the fact remains that this valuable food-fish is back again in normal numbers.

Among the coral reefs off Florida one frequently sees millions of the fry of some pelagic or surface swimming offshore species taking shelter in and about the skeleton ribs and plates of a wreck resting on the ocean bottom, yet easily discernible in the clear southern waters, which offers a harbor for a considerable number seeking safety. Not only does the structure of the abandoned ship provide hiding places, but the grouper family, which makes the wreck a regular habitat, acts as a guard for the smaller fish against their arch enemies, the jacks and yellow tails, which are in turn sought by the groupers as food. The fry thus frequently remain unmolested, as they are too small to make food for the groupers.

When the fry move from place to place, they usually do so at dusk or through the night, and then on the surface of the sea, where they find their principal food—plankton, the weak floating organisms, and nekton, the actively swimming animal life—which is more plentiful on the surface after the sun's rays are lessened.

A PARADOX OF PROTECTION

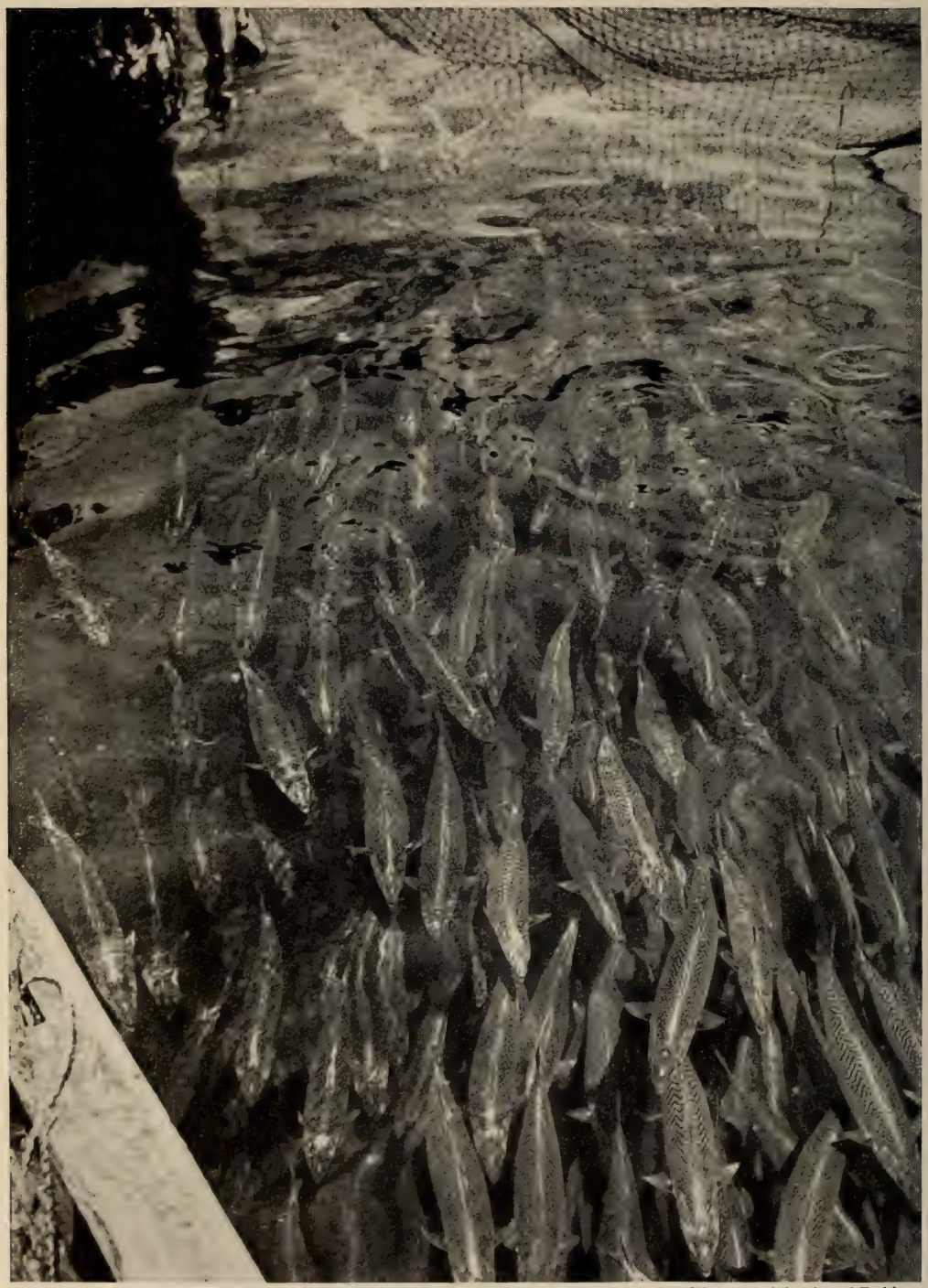
Many fishes of the warm seas are chameleon-like in their coloration and take on the color and hue of their surroundings for protection, while others seek the holes and crevices into which the pursuing fish is unable to follow.

Some fishes, to protect their young, carry their eggs in their mouths. Nature has so taken care of other species that they are hermaphrodite. Others live in the gill cavities of a greater fish. Some species of the sucking fish, as an illustration, utilize the gill cavities of larger fishes, such as the mola, or giant sunfish, and the sailfish, for this purpose.

Many live in other marine animals. The amia, for instance, lives with the animal in the large West Indian conch (*Strombus gigantus*), whose spiral shell so beautifully tinted on the inside was frequently used as a fireplace ornament a generation ago. While there finding protection, this little fish carries its eggs in

A TARPON WEIGHING 158 POUNDS, TAKEN IN FLORIDA WATERS BY MR. ALFRED SANFORD

The tarpon was one of the earliest of the large fishes for which sportsmen angled. Consequently it has been extensively advertised, and therefore is the most widely known of the sea fighters.



Photograph by Angel Rubio

BROUGHT TO THE NET: A HAUL OF FISH PHOTOGRAPHED JUST BELOW THE SURFACE OF A TROPICAL SEA

The fecundity of certain species of fish is amazing. For example, a 6-pound mackerel produces one and a half million eggs at a time, while a 77-pound cod produces more than nine million eggs (see text, page 27).

its mouth. Another species, the Fierasferer, lives in the sea-pudding, one of the Holothurians, or sea-cucumbers.

The sea-horse and the pipefish carry their eggs in external caudal pouches. And so it is that in probably thousands of other ways Nature makes provision for the offsetting of the constant cannibalistic warfare against life in the seas.

Into the battle for and against the multiplication of these species steps man, who, provided with human mind and intellect, looks to the sea for food, diversion, and for useful products of benefit to his kind. Industries have been built up which take countless millions of fishes yearly for food and other commercial uses.

THE LURE OF THE SINGING LINE

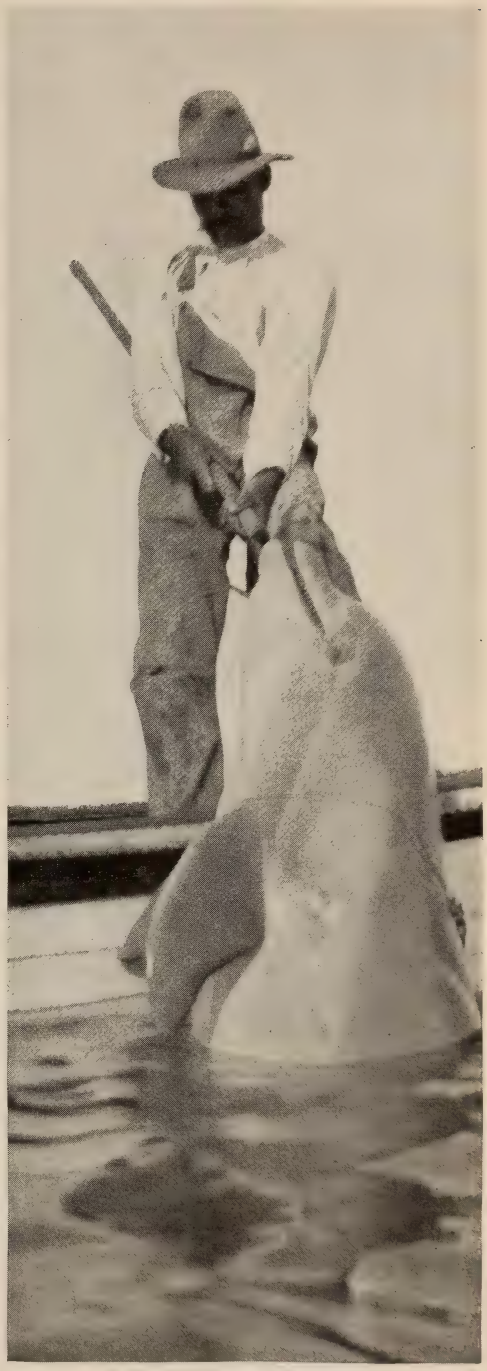
It is doubtful if there is any one except the biologist who appreciates the living things in the sea more than do sportsmen, who come in ever-increasing numbers to the fishing grounds for a try at their health-giving, out-of-doors recreation.

The big-game hunter of the land, when coming upon a bull moose standing clear of the woods and providing an excellent opportunity for a shot, will sometimes tremble so that he is unable to pull the trigger. So there is a thrill all its own in the striking of the tarpon, sailfish, or some of the other game fishes of the Gulf Stream. It has been said truly that one strike invariably means a convert.

Wary, strong, and of remarkable gameness, it is true that these wonderful fishes try the strength, skill, and endurance of even the best and most experienced angler; and, when the prize is finally landed, the successful one feels all the exultation of one who has waged a mighty battle and won.

THE VALUE OF ADVERSITY

The tarpon in Florida waters, like the tuna or tunny in southern California fishing areas, is looked upon by the general public as the premier among game fishes and occupies a highly specialized place in the estimation of all persons of either sex interested in this sport. The "Silver King," as the tarpon is called, was one of the earliest of the large fishes for which sportsmen angled. Consequently it has been the most extensively advertised



Photograph by Van Campen Heilner

THE SOUTHERN PORPOISE, SOMETIMES ERRONEOUSLY CALLED DOLPHIN

The great flats of the Bay of Florida is one of the favorite feeding grounds of this swift and graceful fish. When harpooned it puts up a long and thrilling battle.

Photograph by John O. La Gorce

A SCHOOL OF PORPOISE MIGRATING

The porpoise in great schools move up and down the Atlantic coast during certain periods of the year. They are said to devour their weight in fish every forty-eight hours.

through word of mouth by prideful captors and in song and story, and so has come to be more widely known than its competitors. Such is the value of advertising.

But while many worship at the shrine of the tarpon, some of the more experienced sportsmen, equipped with light tackle, esteem just as highly, if not a grade higher, the gameness of other fighters of the warm seas, such as the sailfish, the wahoo, and the bonefish. The bonefish of recent years has become particularly popular among sportsmen, and world-wise anglers journey even from Europe to Florida to match their ability with this animated steel spring.

The tarpon is abundant in Florida waters, on both coasts, where hundreds of sportsmen, winter and summer, seek it for the thrill and pride of capture it provides. When one is caught with rod and reel, it leaps repeatedly from the water, and as the sunlight plays upon its glistening scales while the angler battles constantly to prevent it from freeing itself during the struggle, the thrill must be experienced to be fully appreciated.

This best-known of the larger game fishes of the sea is bluish on the back, with its under parts and sides a wonderful, glistening silver (Color Plate X). Its scales are large and iridescent and are utilized in the making of numerous fancy articles which find a ready market as souvenirs of the habitat of the tarpon. Little is known of the breeding habits of the tarpon, but very young individuals are found in brackish waters, where they remain until strong enough to enter into the life struggle of the deep.

THE SAILFISH A CLOSE COMPETITOR FOR POPULARITY

The sailfish is considered a highly desirable fish to encounter, for not only is it valued for the resultant sport after being hooked, but it is also highly prized for the excellent mounted trophy it makes. Many of these fish adorn the home walls and club-rooms of anglers who take pride in their catches (Color Plate XII).

It was this fish which afforded the Chief Executive and members of his official family their sport last spring when

Photograph from Miami Aquarium

A 16-POUND MUTTON FISH BITTEN IN TWO BY A LARGER FISH

Landing half a fish is not a rare experience for sportsmen at Miami, Florida, for the hungry barracuda is sometimes quicker than the man with the line. The mutton fish was seized and contended for while being hauled into the boat.

in Miami waters. After his strenuous campaign and before assuming his manifold duties, President Harding matched his skill with much success against the huge game fishes of the Gulf Stream. Caught with light tackle, such gamesters require considerable skill in the landing, being very strong and of supreme courage. The tarpon and sailfish when hooked leap repeatedly many feet into the air in their efforts to free themselves from the hook and are very frequently successful in such ring generalship (see pp. 28, 29, 30).

The sailfish is not only a good sporting fish, but is also of considerable food value as well. This remarkably swift oceanic citizen is of unusual shape; its large, sail-like dorsal fin and its rapier-like spear make it a curiosity much sought after by the angler.

Little is definitely known of the use of the large dorsal fin, but it is not unusual to see it "hoisted" on the still waters of the tropics in the fish's surface dashes after prey. Its likeness to a boat's sail led inevitably to the fish being dubbed by its common name.

The marlin fish, which is a close relative of the sailfish and built very much on the same lines, has the sharp, protruding snout, but the dorsal fin is much smaller. It is purely a pelagic species. It is an excellent food-fish. The marlin is not so numerous as the sailfish, nor does it grow to be as large in Florida waters, but it is gamier, and, like most of the fighting fishes of southern localities, has a penchant for leaping clear of the water in its struggles for freedom (Color Plate XV).

THE DOLPHIN OF THE MARINER NOT THE FISH OF THE ANCIENTS

Of the game fishes the dolphin must be mentioned in the front rank. Much has been told of this wonderful species, and to the speed-loving American it is looked upon as one of the greatest of fishes, for there is probably no other citizen of the deep which travels so swiftly. It spends its entire life in the open seas. While idling, its movements are sluggish, but when in quest of its prey it moves with incredible rapidity, and to one observing its movements it appears like nothing so

much as a dash of color in the sea—a yellow-blue-whitish streak that is almost lost in the green water (Color Plate VIII).

Of all deep-water fishes, the dolphin possesses the greatest power to change its color. A dying dolphin affords a most beautiful and spectacular sight, when, with all the iridescence of an opal, it changes hue so rapidly that the brain cannot grasp the beauty of one color before another comes into view. In life its general color is a blue or emerald green above, with brighter blue dots showing on the base; the under parts are silvery and the caudal and pectoral fins are a clear yellow. It is an excellent food-fish, but, being not common in quantity, has little commercial value. It is caught usually only by chance, when one is fishing for other game fishes which inhabit the regions where the dolphin lives.

THE BONEFISH, A STEEL SPRING OF THE DEEP

The bonefish represents a single species, inhabiting all warm and tropical seas. It is considered to be among the most indefatigable fighters of fishdom, and is a source of much sport to the angler, who will often travel hundreds of miles for an opportunity to match his skill and wits with this fish. Its name is, like most common names of fishes, derived from its most striking feature, in this case an internal one. Its bony structure is similar to that of the herring.

In the localities where this fish abounds the natives have a way of stretching it before cooking, so that the bones may be released from the flesh. When cooked properly, after this operation, it provides a fine dish and the bones may be easily drawn out.

The color of the bonefish is a beautiful glistening silver and the scales are much desired by the natives of the West Indies. In fish-scale work for decorating ladies' costumes the scales of this fish are used. The writer has seen an evening gown made wholly of bonefish scales which was indeed a thing of beauty. The scales were bored and laid on a fabric base like shingles on a roof. The resultant effect was like that of the natural body of the fish (Color Plate IX).

Of all silvery-colored fishes, probably none equals the moonfish in beauty. These sluggish little fishes frequent shady places and sandy shores, where they are taken in seines in large quantities. To the quiet observer of their habits, they appear to be duly appreciative of the fact that they are admired, for they seem to be forever cleaning and preening themselves in the sands (Color Plate V).

The peculiar, moon-like contour of the bodies of these fish is mainly responsible for their name. They are literally the "high-brows" of the fish tribe, their high foreheads giving them what passes for the appearance of intellectuality. When seen at close range, the iridescence of their silvery bodies is more beautiful than mother-of-pearl, which the sides of the fish so closely resemble. They glisten in the sunlight like the sun flash from a mirror. As a food-fish they are equally as good as the pompano, which is high praise indeed.

Traits which mark land animals, with which man is more familiar than he is with the sea-dwellers, can be traced in the turbulent life under water. Killer-whales travel in packs like wolves and stalk their prey in much the same way. Other fishes, because of their appearance, have been given names to indicate a resemblance to land forms. There is the dogfish, the sea catfish, and the hogfish; but it is doubtful if ever a fish was given a more appropriate name than the nickname bestowed on the barracuda.

THE TIGER OF THE SEA

The barracuda is a carnivorous pirate from the tropical and subtropical regions and has been recorded as reaching a length of eight feet. It is amazingly swift in action, and strikes its prey without hesitation, on sight, darting with lightning rapidity at any moving thing in the sea, big or small, fast or slow. While cruising, its movements are slow and sluggish, and its habit of frequently hiding under some floating log or pinnacle of rock reminds one of a U-boat lurking in the ocean lanes, but ready to strike down the passerby (Color Plate I).

When taken with rod and reel, this fish proves to be a savage fighter. Its teeth are most sinister in appearance, having on each side a sharp, cutting edge, which, with the powerful leverage of its mighty jaws, make it a formidable foe. It will

BARRACUDA (*Sphyraena barracuda*)

Well deserving its name of "The Tiger of the Sea," the carnivorous Barracuda darts at its prey on sight and attacks fish many times its own size. Numerous instances are recorded of the Barracuda attacking human beings, and the natives of the West Indies fear it even more than they do the shark. It reaches a length of eight feet or more, and by many is considered a good food fish, although individual specimens are reported to be poisonous at certain seasons of the year. It is found in tropical and subtropical waters, from Cape Cod south to Bahia and Bermuda, and is common among the Florida Keys.

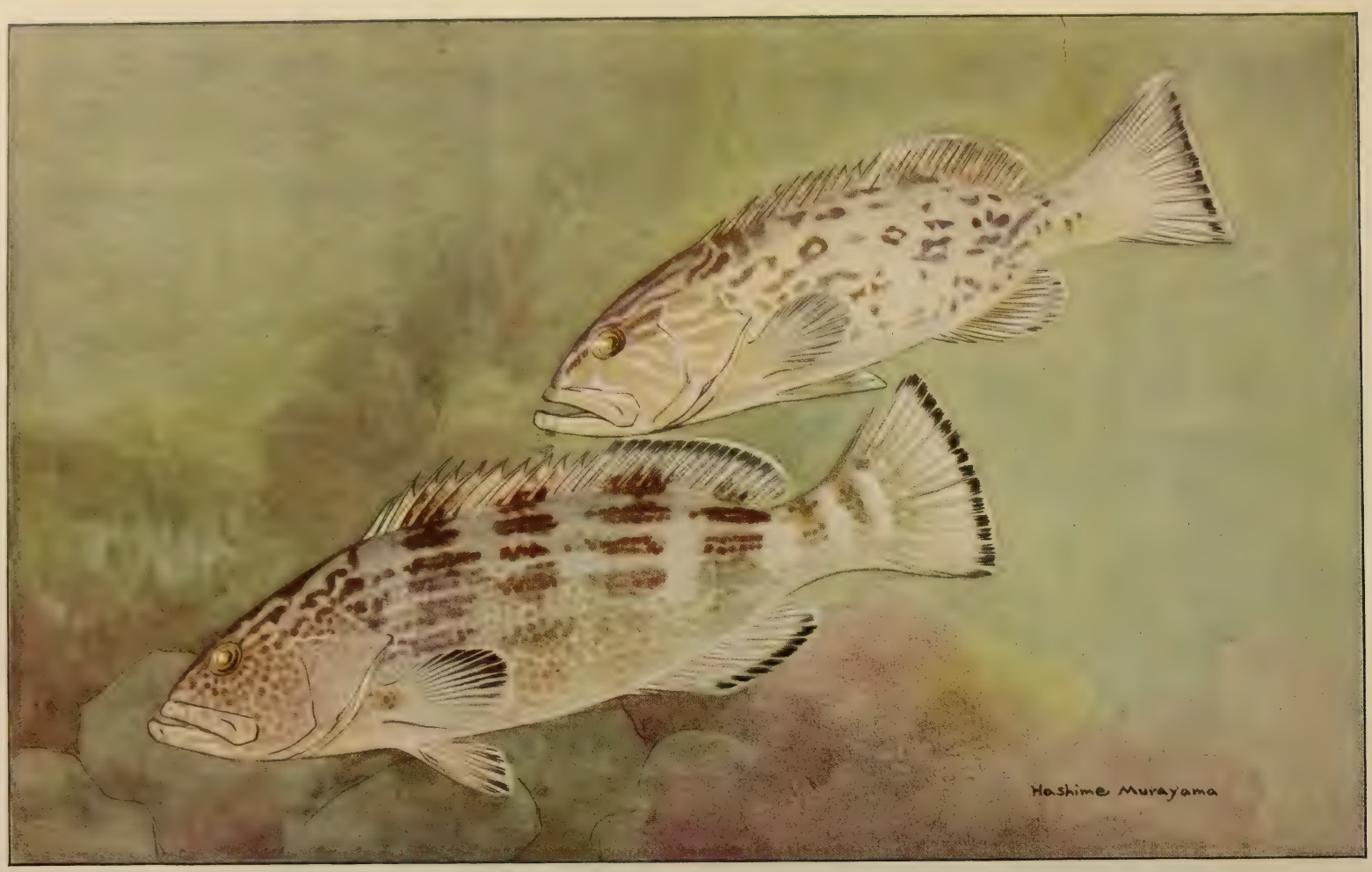
MUTTON FISH (*Neomaenis analis*)

Living on rocky and grassy bottoms and feeding on small fish and crustaceans, the Mutton Fish is a food fish of great importance, and is taken at Key West in great quantities. It is the gamest fighter of the numerous Snapper family, and reaches a weight of twenty pounds or more. It is found from Pensacola to the West Indies, and south to Brazil.

RED GROUPER (*Epinephelus morio*) [upper]; NASSAU GROUPER (*Epinephelus striatus*) [lower]

The Red Grouper lives a solitary existence among the coral reefs except during the breeding season, when it becomes gregarious. It is a good food fish and reaches a weight of forty pounds. Thousands of pounds are annually brought into the Key West markets for local consumption and northern shipment. The species is found on the Atlantic Coast from Virginia south to Rio de Janeiro, and is common among the Florida Keys.

The Nassau Grouper is gregarious during the breeding season, when it is taken in great numbers. It reaches a weight of fifty pounds, and is caught with the hook readily, but is not particularly game. It has a remarkable power of changing its color. Its habitat is the West Indies, and from Miami to Brazil, being common in the vicinity of Bermuda.



GAG (*Mycteroperca microlepis*) [upper]; BLACK GROUPER (*Mycteroperca bonaci*) [lower]

Living among coral reefs, the Gag is one of the commonest of the Grouper or Rock Fish family. It is a good food fish, reaching a weight of twenty pounds or more. It takes the hook readily and is more game than the other species. It is found in the South Atlantic and on the Gulf coast of the United States, from Carolina to Pensacola and Bermuda, and is common among the Florida Keys.

The Black Grouper lives a solitary life among the coral reefs except in the breeding season, when it is gregarious. An excellent food fish, it reaches a weight of one hundred and fifty pounds or more. It is strong, but not a game fighter. It is abundant about Miami, among the Florida Keys, and is found throughout the West Indies, in Bermuda, and from Pensacola south to Brazil.

THE MOON FISH (*Selene vomer*)

This highly esteemed food fish, which reaches a length of a foot or more, lives on sandy shores and feeds on small fishes. It is taken in seines in large numbers about the Florida Keys. In appearance it is most beautiful, suggesting mother-of-pearl. It is found in tropical America on both the Atlantic and Pacific Coasts, from Cape Cod to Brazil, and from Lower California to Peru.

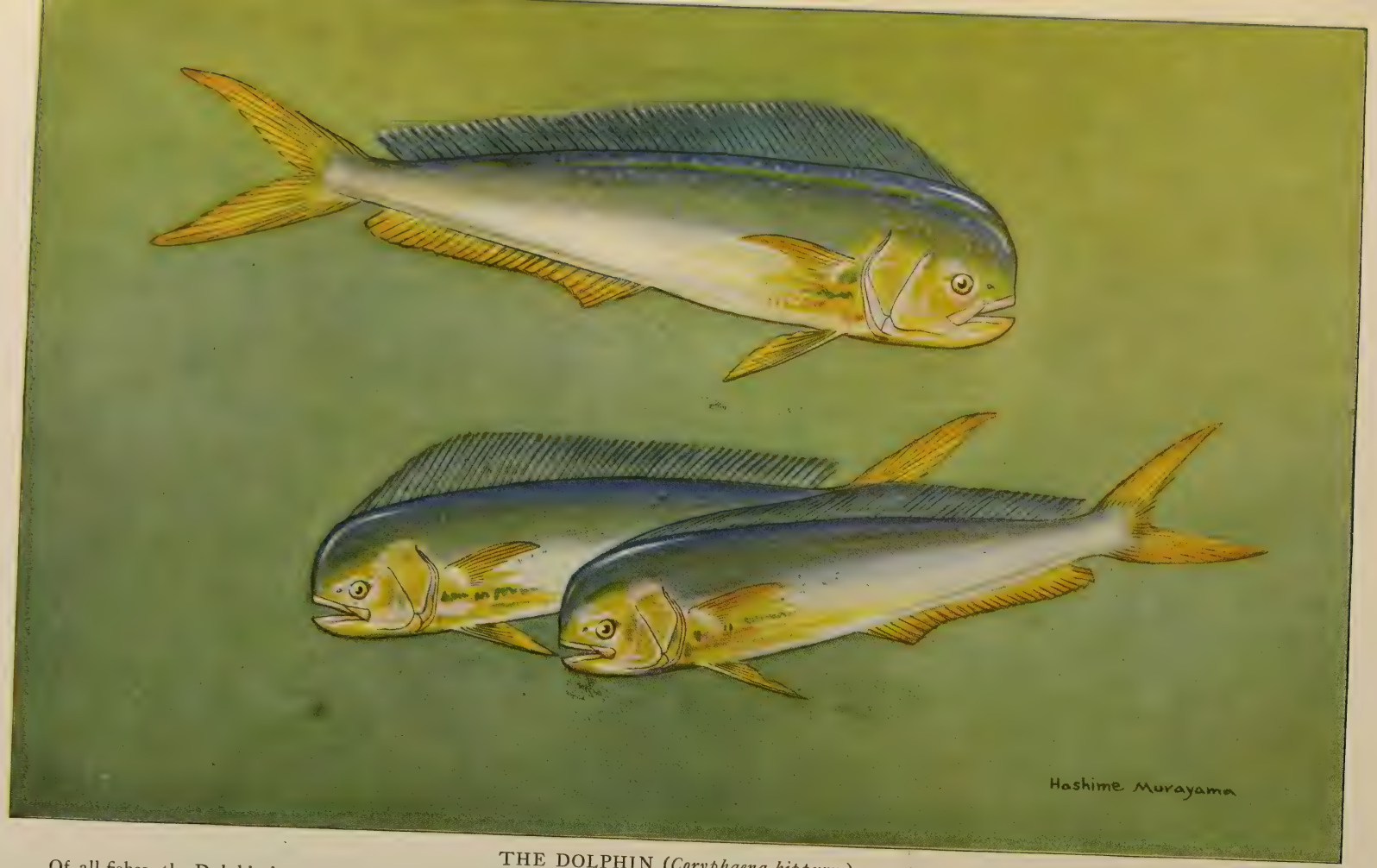
THE MARGATE FISH (*Haemulon album*)

The Margate Fish is a food fish of considerable importance in Florida markets, reaching a weight of ten pounds. It is the largest and gamest fighter of its family. It is found in the Bermudas, West Indies, Florida Keys, and south to Brazil, living on coral and grassy bottoms, and feeding on crustaceans, worms and mollusks.

SPANISH MACKEREL (*Scomberomorus maculatus*) [lower]; KINGFISH (*Scomberomorus cavalla*) [upper two]

Living in warm seas and appearing in large schools in the Gulf of Mexico and on the Carolina coast, the Spanish Mackerel is one of the best, and perhaps the most popular, of American food fishes, averaging from four to five pounds, but reaching a weight of twelve pounds or more. It is found on both coasts of North America, and on the Atlantic seaboard from Cape Ann to Brazil.

The Kingfish, a game fighter on light tackle, is one of the principal food fishes of the Florida coast, attaining a length of five feet and a weight of one hundred pounds, with an average weight of from ten to fifteen pounds. The rows of yellow spots on the sides of the young disappear in the adult. The Kingfish is found in tropical Atlantic waters, the Gulf of Mexico, and the coast of Africa and Brazil, coming to the Florida Keys in vast numbers in the winter months.

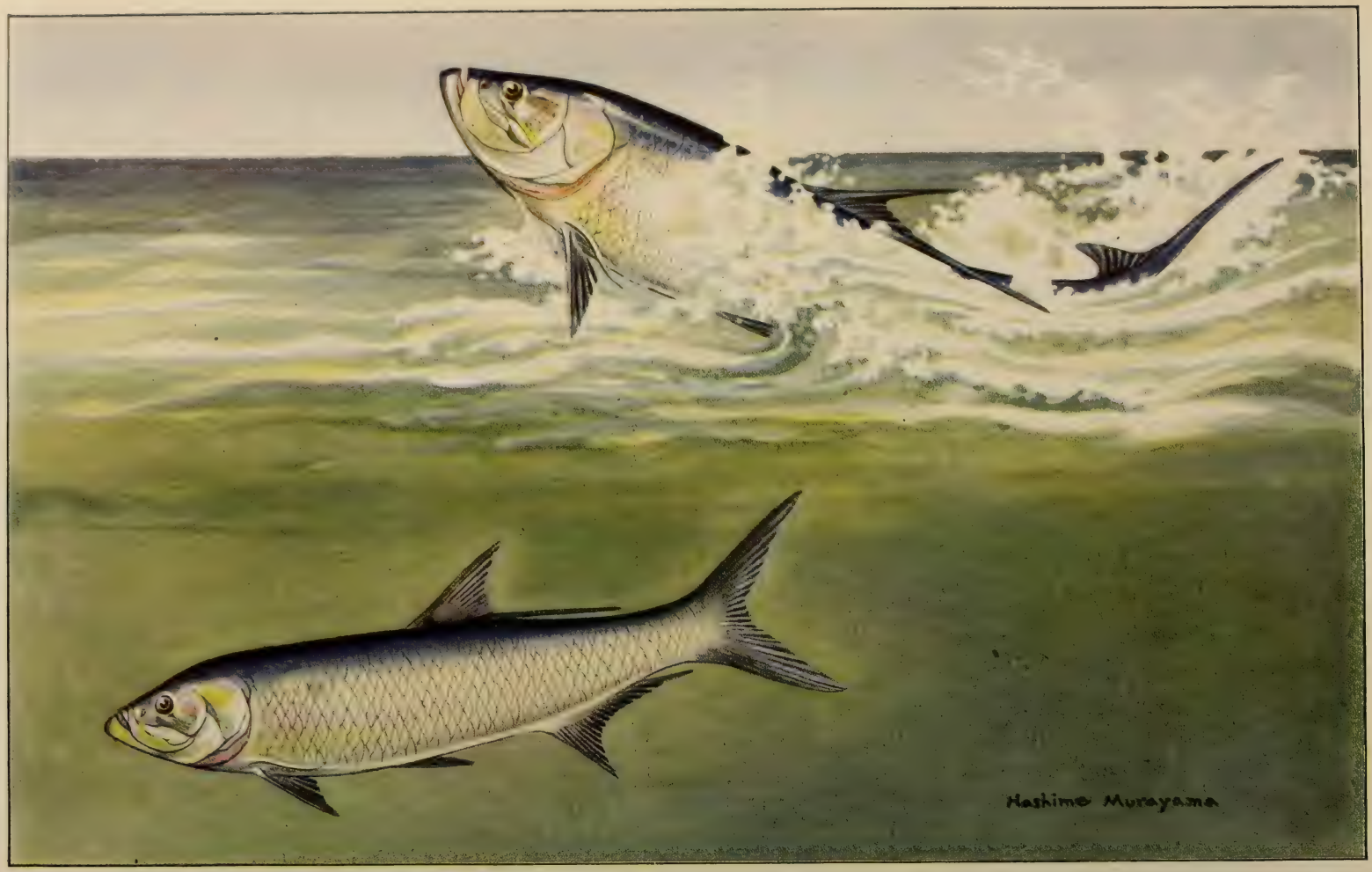


THE DOLPHIN (*Coryphaena hippurus*)

Of all fishes, the Dolphin is probably the fastest swimmer. When pursuing its prey, which, in the open sea, consists principally of flying fish, it swims under the flying fish, and captures it at the moment when it touches the water. The Dolphin is an excellent food fish, very game when hooked. It reaches a length of six feet and a weight of seventy-five to one hundred pounds. It inhabits the high seas in warm regions, and is taken from Cape Cod to the West Indies. This is the Dolphin of the mariner, not the Dolphin of the ancients, which is a mammal.

THE BONE-FISH (*Albula vulpes*)

This beautiful silvery species when removed from the water glistens in the sunlight like a mirror, and is considered one of the best fighters on light tackle, small Hermit crabs being used as bait. It is a food fish much esteemed in the West Indies, reaching a length of three feet. It is found in tropical seas, and is common in the Bahamas and the Florida Keys, living on sandy and muddy shores and feeding on crustaceans and worms.

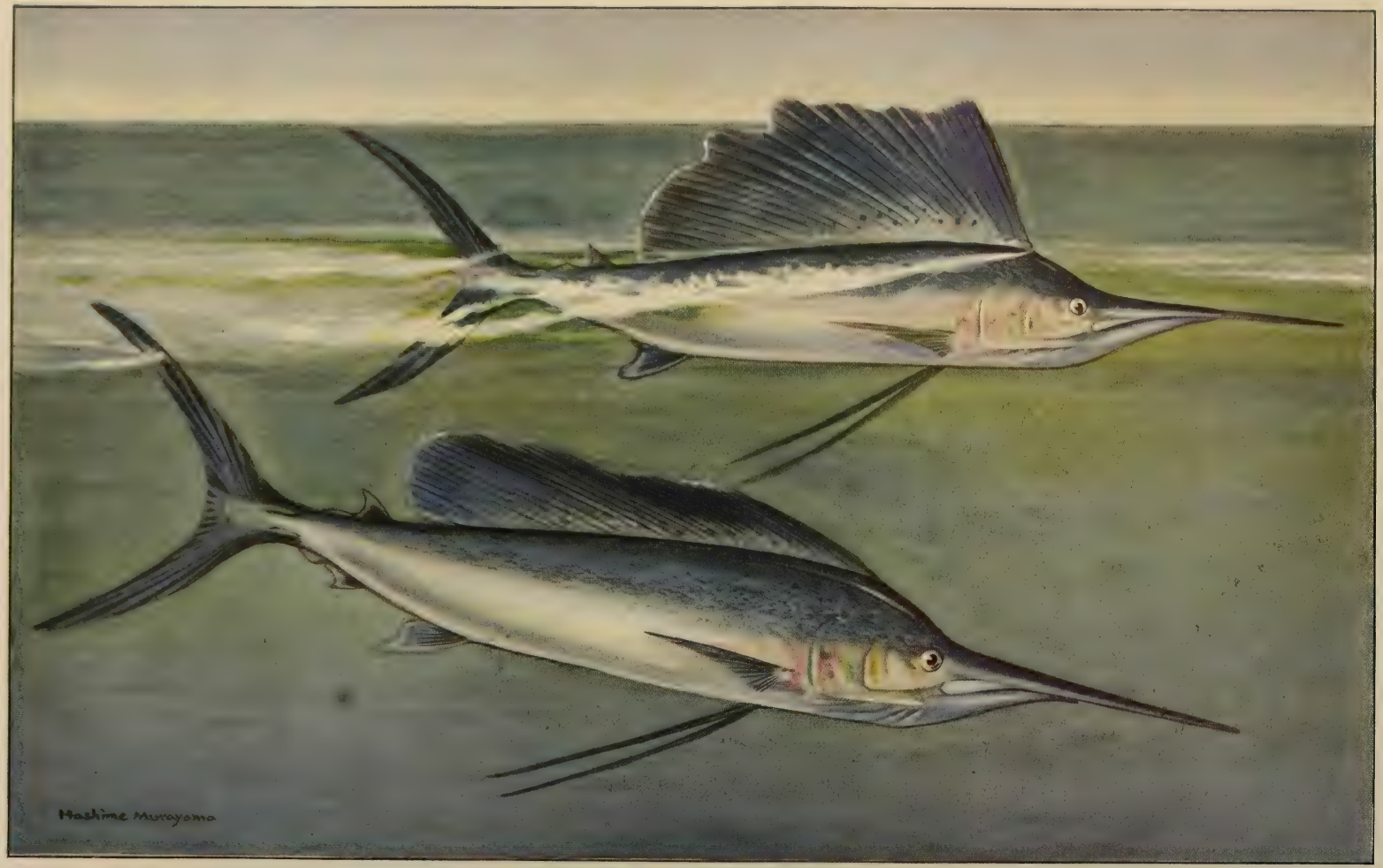


TARPON OR SILVER KING (*Tarpon atlanticus*)

To the salt water angler, the Tarpon is the most sought after of all game fishes. As it dashes about and leaps from the water, trying to shake itself free from the hook, its large scales glisten in the sunlight like molten silver. The Tarpon reaches a length of more than eight feet and a weight of two hundred pounds. It is not considered a good food fish, the flesh being dry and coarse. It lives among the Florida Keys, in bays about the entrance of rivers, sometimes entering the rivers for a considerable distance, and frequents brackish waters. Little is known of its breeding habits. It feeds on small fishes, mullet being considered the best bait, and is found from Long Island south to Brazil, in the West Indies, and on the east and west coasts of Florida, being common among the Florida Keys.

THE CRAWFISH OR SPINY LOBSTER (*Panulirus americans*)

A shell fish of great importance, the flesh of the Crawfish, which has a most delicate flavor, is highly esteemed as food, and is excellent bait, being taken by almost all Florida fish. It reaches a length of four feet but averages eighteen inches. The illustration shows the male and female. The female (on the left) has a small pinching claw on the last leg, which is used to comb the eggs and free them from foreign substances, as well as to remove the dead eggs. Thousands of pounds of Crawfish are marketed annually in Florida alone. It is found in the West Indies, the Bermudas, and the Florida Keys. It lives among the rocks in salt water, and feeds on mollusks.



SAILFISH (*Istiophorus nigricans*)

Much sought for by anglers, as its game qualities are second to none, the Sailfish is an excellent food fish and reaches a length of eight feet or more, and a weight of one hundred and fifty pounds. It inhabits warm seas, and is common in the Florida Straits.

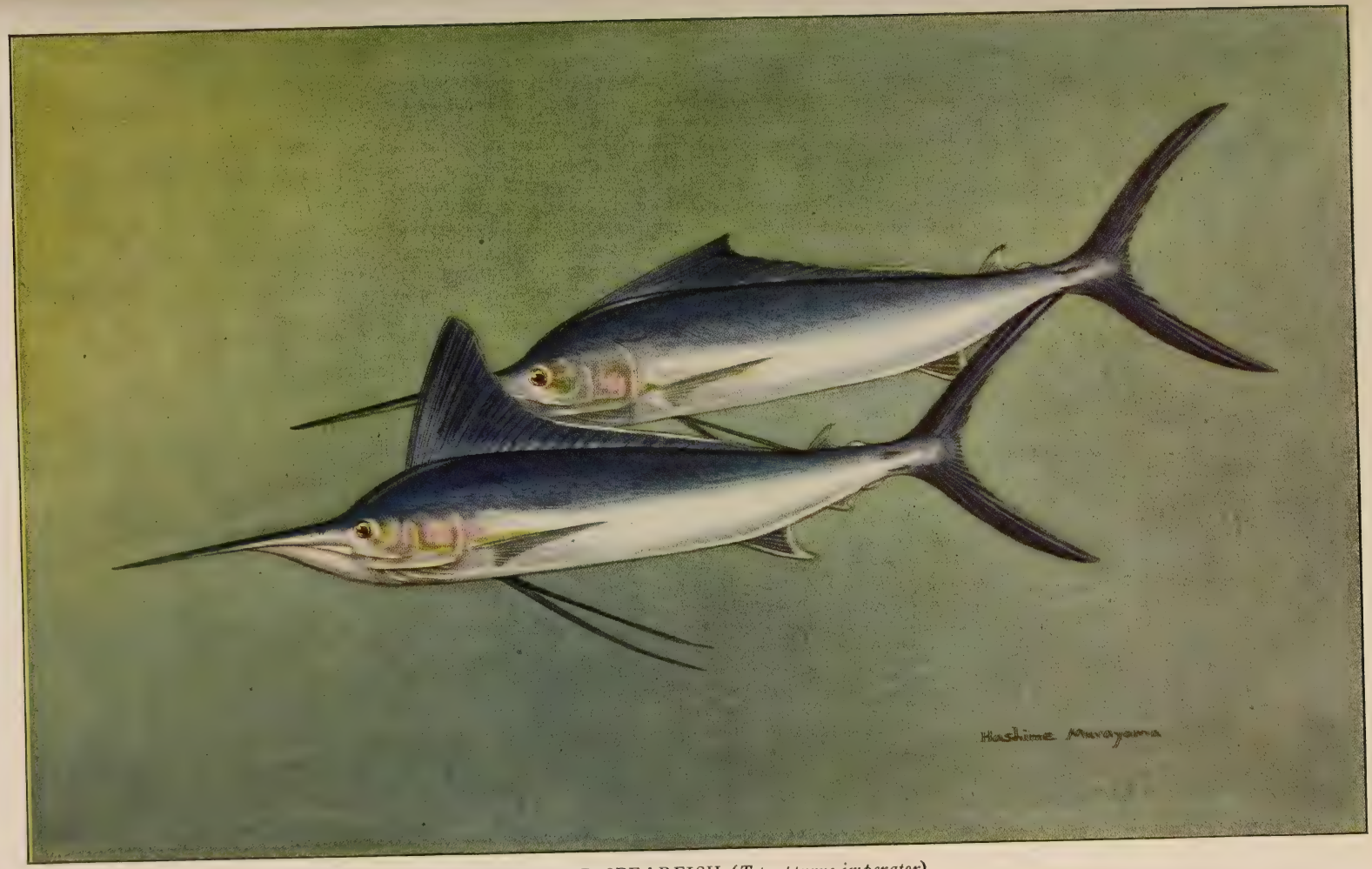
AMBER JACK (*Seriola lalandi*) [upper]; YELLOW JACK OR RUNNER (*Caranx ruber*) [lower]

Living near the surface of the water and often frequenting old wrecks and open waterways, the Amber Jack is common among the Florida Keys. It feeds on small fishes and mollusks, and takes the hook readily, being unexcelled as a fighter. It attains a length of five or six feet, and a weight of one hundred pounds or more, and is a good food fish. It is found off the coast of Florida, the Bermudas, and the West Indies, south to Brazil, and as far north as New Jersey.

The Yellow Jack lives in the open waters, bays, and inlets, and feeds on small fishes and mollusks. It is a game fish of rich flavor, and reaches a weight of ten or twelve pounds. The name *ruber* (red) is misapplied, as it never has this hue. It is found in the West Indies, Bermuda, and north to Woods Hole, being common among the Florida Keys.

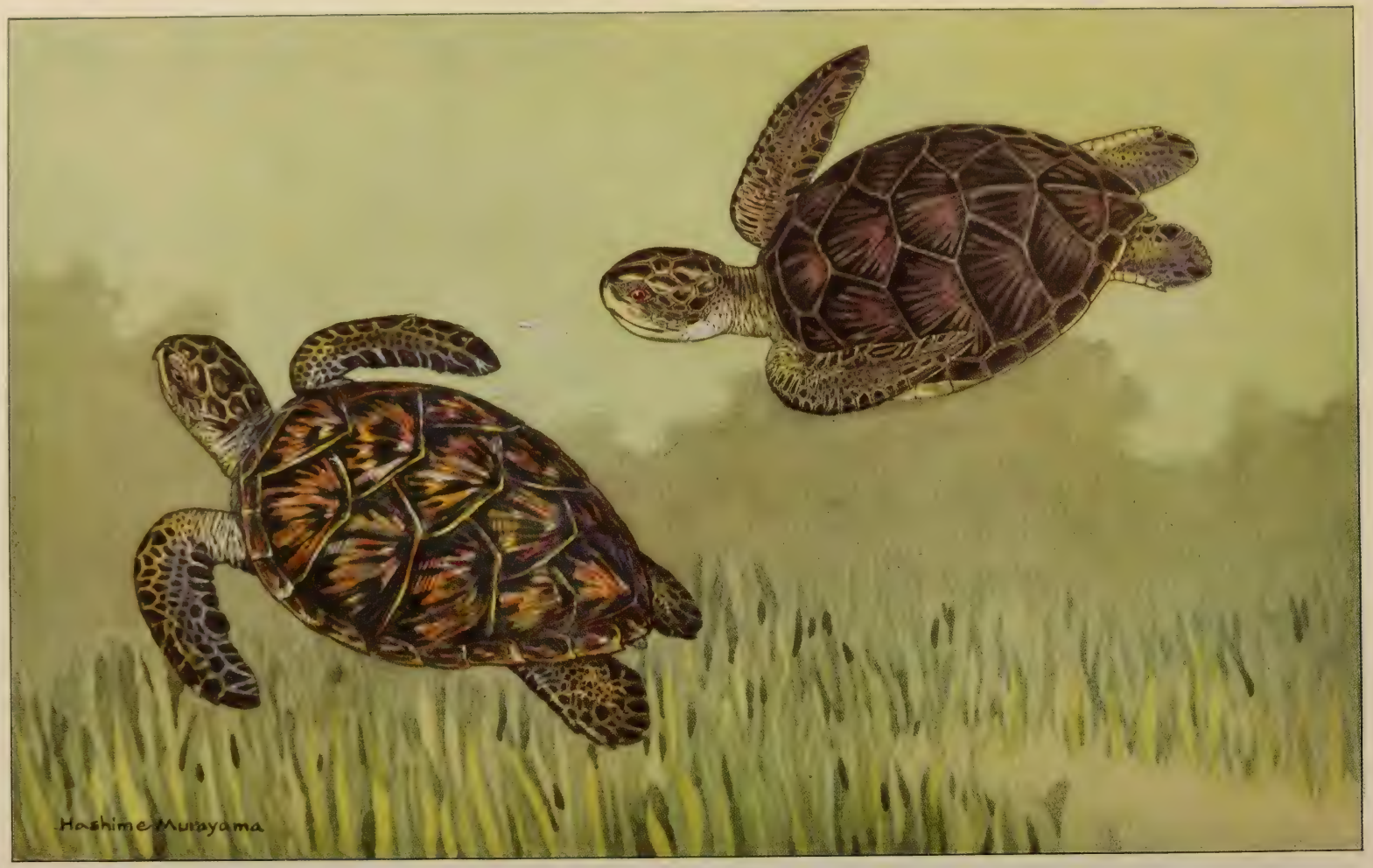
ALLISON'S TUNA (*Thunnus allisoni*)

Little is known of this beautiful Tuna, specimens of which have been recently taken. It feeds on squid and flying fishes, and can be distinguished easily from the other species by its long dorsal and anal fins. Specimens weighing from 143 to 155 pounds have been taken. The species is named in honor of James A. Allison, President of the Miami Aquarium and Biological Laboratory. It is found on the east coast of Florida in the Gulf Stream.



MARLIN OR SPEARFISH (*Tetrapturus imperator*)

Not as frequent as the Sailfish on the Florida coast, the Marlin is easily distinguished from the former by its low dorsal fin. It is a very game fish and esteemed as food. It reaches a length of eight feet or more, and a weight of one hundred pounds. Its habitat is the West Indies, but it occasionally ranges as far north as Cape Cod.



GREEN TURTLE (*Chelonia mydas*) [upper]; HAWKSBILL TURTLE (*Eretmochelys imbricata*) [lower]

The Green Turtle is most highly prized as food, having no equal among the Sea Turtles. It reaches a weight of seven hundred pounds or more, but has an average weight of fifty pounds. It is herbivorous, feeding on marine plants, especially Turtle Grass (*Zostera marina*). It is found in the West Indies, off the coast of Florida, Bermuda, Ascension Island, Mosquito Coast, the Bahamas, and Brazil.

The Hawksbill Turtle furnishes the tortoise-shell of commerce, hence its high economic value. Great quantities of its shell come from the West Indies annually. The flesh is not so highly esteemed as that of the Green Turtle. It has an average weight of thirty to forty pounds, but two hundred pound specimens have been taken. It lives on fish, crustaceans, and mollusks, among coral reefs of Florida and Bermuda, the Gulf of Mexico, as far south as Brazil.

attack almost any kind of sea denizen, its own species included, no matter what the size, and with one snap it can sever the body of an unbelievably large fish. This has been demonstrated often to fishermen, who have had their catch taken by the barracuda before it could be hauled into the boat (see page 35).

Natives of tropical waters fear the barracuda more than the shark, and with good cause, as is attested by the injuries this fierce fish has inflicted on the bodies of individuals who have been so unfortunate as to be struck by its wicked jaws.

Yet this ferocious creature, like practically all fishes kept in captivity, becomes docile when properly cared for. At the Miami Aquarium, so admirably located at Miami Beach, Florida,* one of the aquarists, when superintending the cleaning of the tanks, will pet the barracuda much as a child strokes the back of a pet cat, and the fish will, in a seemingly gentle way, take food from his hand.

Although in some sections the barracuda is said to be poisonous during certain seasons of the year, in reality it is a good food-fish. The writer investigated reports that the fish is poisonous, and in the sections where the belief was prevalent could find no reason for it, other than that the flesh had probably been kept until it became tainted and ptomaine poisoning was the result. A number of barracuda were caught, cooked, and eaten in order to demonstrate to the natives that the fish, if properly kept and prepared, is a wholesome fish at all seasons. As a result, in many places the minds of the natives have been disabused in regard to the edibility of the barracuda.

This misconception in regard to the barracuda is typical. Those who handle fish daily, even the old-time fisherman who can at any time lead one directly to the habitat of those fishes peculiar to the waters in which he operates, does not fully understand the food values of the creatures with which he deals. To realize this it is only necessary to investigate, even casually, the fish markets along the southern Florida coast; their counterparts in the Bahama Islands directly opposite and divided by but a few miles of water; and those of the West Indies, to the southeastward and almost as close. In these three localities, their shores laved by the same stream, in practically the same climate, the food-fishes chosen in the market are in many cases so unlike as to lead one to believe that altogether different ranges of sea life exist in the three sections.

* See "The Treasure House of the Gulf Stream," by John Oliver La Gorce, in the National Geographic Magazine for January, 1921.

FOOD VALUE OF WARM-SEA FISH

In the Florida markets the several members of the grouper family are highly considered and find a ready market, while in Bermuda these fishes are not looked upon with favor. The groupers represent one of the largest families of fishes in tropical and subtropical waters. Some of the species reach a length of eight to ten feet and weigh, at times, as much as 600 pounds.

The black grouper, which grows to be one of the largest of the family, is extremely wary and is one of the most difficult of fishes to land. When one is still-fishing, this species will sometimes encircle the bait for hours before deciding to take it.

One would imagine that the fish looks its surroundings over very carefully before venturing to take the bait; but, when apparently satisfied that it should take it, the black grouper bites at it most viciously and forthwith makes for the nearest hole in the coral reef, and thus it often frees itself by running the line over a sharp edge of the reef. Once the hooked fish reaches a hole, it is almost impossible to bring it again to the surface. Trolling is by far the best way to take the black grouper (Color Plate IV).

The Nassau grouper is another large member of the family. It, like the other groupers, inhabits the coral reefs and lives a solitary life, except during the breeding season, when it is gregarious. During this period it congregates in large shoals, from which habit the family receives its name. The Nassau species changes color with great facility, but during the change a black spot at the base of the tail retains its deep color, no matter what other tints may come and go all over its body (Color Plate III).

The red grouper is not, on the average, as large as its Nassau cousin, forty

Photograph from Miami Aquarium

CURIOSITIES OF THE OCEAN FLOOR

Not white chrysanthemums but giant anemones very much alive and constantly moving their long petals in search of minute particles of food. The clusters of black hatpins are living sea-urchins so protected by their movable quills that few marine animals disturb them. The hermit crab walks about with his borrowed home, an empty conch shell, and the star-fish is much in evidence. The beautifully tinted sea-fan forming a background for a long-spined sea-urchin is thriving in a cluster of coral.

Photograph from Miami Aquarium

BARNACLES ON THE KEEL OF A SHIP IN DRYDOCK

The barnacle (*Balanus*), sometimes called the acorn barnacle, is of the crab family, a crustacean which secretes its own lime for its outer covering. Its minute spores when thrown off attach themselves as quickly as possible to some object—a ship's bottom or piling—growing rapidly and attaching one upon another until a stag horn is formed, reaching five or more inches in length. Investigation has determined that dead barnacles are common carriers of many small fishes, the shell cavity being from two and a half to three inches deep and from three-fourths to one inch in diameter, thus affording a secure touring cabin. So it is that small fish of the Pacific are no doubt transported around the Horn into the Atlantic and to other oceans in the same way This crustacean causes an annual loss of many millions through the fouling of ships' bottoms and retarding the speed of the world's ocean-going commerce.

Photograph by L. F. Williamz

SWELL (PUFFER) FISH FOUND IN FLORIDA WATERS AND ALL WARM SEAS

To frighten its enemies, this fish is permitted by a considerate Nature to fill itself with air when approached. Sometimes it puffs too much and bursts.

pounds being a high weight for this species. It is a good food-fish and is beautiful in appearance. It has habits similar to the other groupers (Color Plate III).

The gag, a smaller-scale grouper, is not only esteemed as a food-fish wherever it may be found, but is also one of the gamiest of the family. It seldom attains a greater length than four feet. Its habitat is principally along the Florida reefs; it also frequents the Bermudas (Plate IV).

The gamiest of the grunts, the margate fish, is another excellent food-fish, likewise the mutton-fish, of the snapper family, which is considered the best fighter of that clan and also the largest. Some mutton-fish reach a weight of as much as 25 pounds (Color Plates II and VI).

THE MAJESTIC MACKEREL AND HIS KINGLY COUSIN

Some of the species mentioned are popular only locally, but the Spanish mackerel is known favorably not only in its own habitat, but wherever shipping facilities are such as to provide for the transportation of this sound, finely flavored fish. Millions of pounds are shipped north annually from the State of Florida alone. From one market, Key West, more than 3,000,000 pounds are shipped each year. They are surface-living fish of great game qualities, elegant in form and color, and among the swiftest fishes of the sea, as their stream-like line and tail indicate. They appear in countless numbers in southern waters from November to March, during which period they are taken in great quantities for the market (Color Plate VII).

Associated with the Spanish mackerel is the kingfish, which is somewhat larger, on the average. Both belong to the same family and are much alike in many respects. As a food-fish, the kingfish ranks next to the Spanish mackerel, and nearly a million pounds are shipped each year from the Key West markets (Plate VII).

THE NUMEROUS JACK FAMILY

Most of the fishes referred to are carnivorous and are not frequently seen in the neighboring waters of populated sections. It is by no means a rarity, how-

Photograph by James A. Allison

FEMALE SAWFISH TAKEN ALIVE IN A NET AND EXHIBITED FOR SEVERAL WEEKS IN A 36-FOOT TANK AT THE MIAMI AQUARIUM

She gave birth to nine young, the only record of sawfish being born in captivity.

ever, for even the most wary—excepting, perhaps, the dolphin—to frequent the haunts of man.

While wariness is a common trait of game fish, one species, the jacks, seems to have no fear of man and his traffic. They may often be observed resting lazily, in tidal waters, under a bridge or near the shore, where the traffic is constant. They cruise slowly around, awaiting the approach of their favorite food, the mullet. When a school of mullets appears in sight, there is instant action. The jacks marshal their forces and bear down upon their prey, upon which they wreak spectacular and terrible carnage.

The amber jack is the largest and gamiest of its family and inhabits both the shoal and deep waters among the Florida Keys, the West Indies, and Bermuda. It provides excellent sport for trolling and will take almost any kind of live bait offered by still-fishing. It is a carnivorous, surface-living fish of considerable food value in the Bermudas and the West Indies, where large numbers are taken for market purposes. It is not so highly considered in the Florida markets, where its cousin, the yellow jack, is more common (Color Plate XIII).

The yellow jack is also a surface-living fish of graceful lines and beautiful coloration. It resembles the amber jack closely, both in habits and appearance, although it does not reach so large a size.

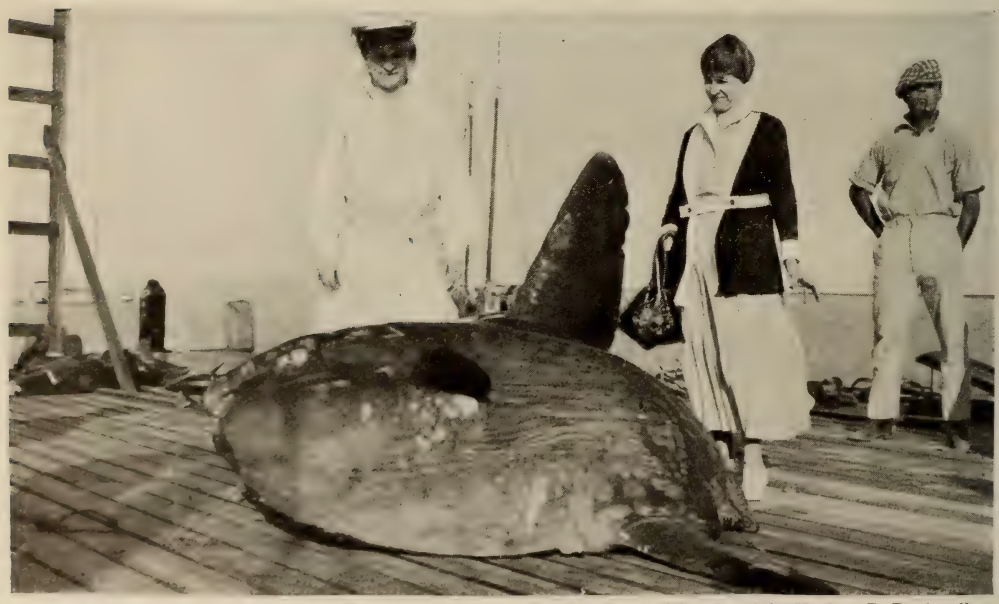
CONTRIBUTING TO THE WORLD'S KNOWLEDGE OF KNOWN FISH

The fishes already mentioned are common in the waters adjacent to the Gulf Stream and are widely known, many miles from their habitat, for their gameness and sporting qualities or for their food values; but now and then a new Gulf Stream species has been found which requires classification.

Such a find was made in the case of Allison's tuna. This beautiful fish, of which but a few specimens have been caught, was taken at the edge of the Gulf Stream, off Miami Beach, Florida. It is proved to be a new species added to the American fauna—a species second to none of the other members of the family

Photograph by Dr. W. H. Longley

THE GRAY SNAPPER (NEOMENIS GRISEUS) AMONG GORGONIANS



Photograph by Herbert R. Duckwall

AN OCEAN SUN-FISH, WEIGHT 1,500 POUNDS, CAUGHT IN THE GULF STREAM OPPOSITE MIAMI, FLORIDA

Photograph by Herbert R. Duckwall

A KILLER WHALE IN ACTION

This scourge of the oceans is feared by all living fish, from the mackerel to the sperm whale. Traveling in packs, the killers are known as the wolves of the sea.

in coloration and interest. It reaches a large size and will in all probability become one of the most-sought-for fishes by anglers in the Florida waters. The newness of the fish will doubtless cause sportsmen to vie with one another in their efforts to land a specimen of record size. The new tunas appear to be most numerous in January (Color Plate XIV).

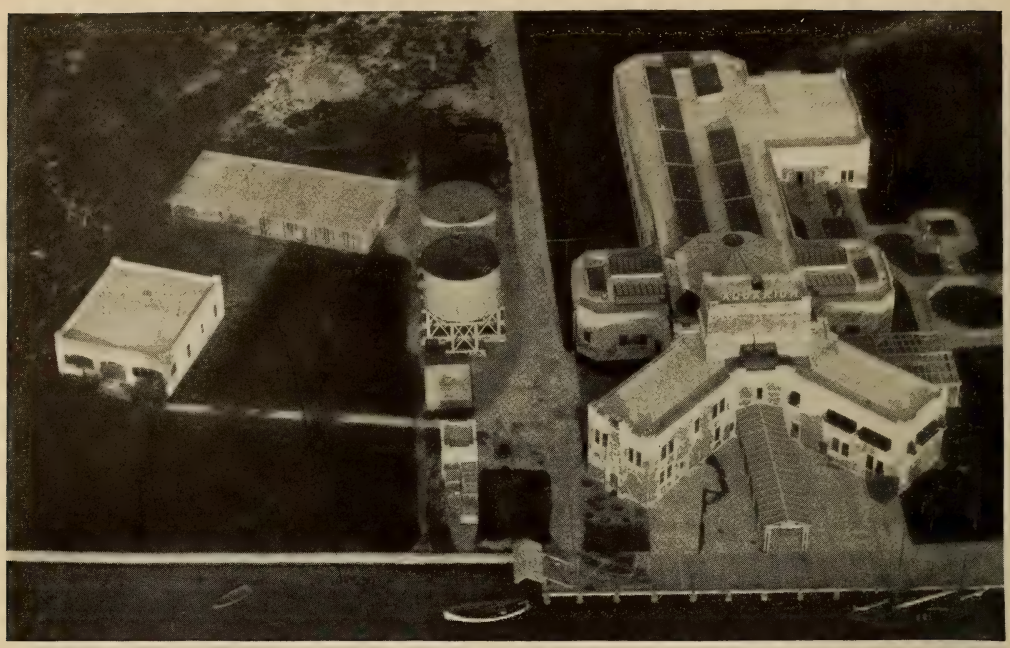
The writer has good cause to believe the reason this fish has not been taken until recently is because the tackle used for the sailfish and other fishes common in the waters harboring this tuna was too light to stand the strain put upon it when this powerful fish struck. Many lines and rods have been broken by large fishes in this section, and sharks have been blamed, when unquestionably, in a great many cases, it was the newly discovered tuna.

The *Thunnus allisoni* is, like the others of the genus, a warm-blooded fish and its flesh is of fine quality and flavor.

Reptiles as well as fish have found the Gulf Stream a kindly habitat; but turtles, probably the most valuable of reptiles, are diminishing rapidly in many of the localities bathed by this great stream of warm water where they were formerly abundant. During the period of slavery it is said that many negroes were prompted to try to escape, in some sections of the South, because they were compelled to subsist mainly on a diet of terrapin. Now terrapin is a much-sought-for delicacy, difficult to obtain. And what is true of the terrapin is also true of practically all other turtles.

Without doubt, the green turtle is the finest-flavored of the sea turtles and the most highly esteemed as food. It is an herbivorous feeder, inhabiting the open seas in the West Indies, the Bahamas, Brazil, the Gulf of Mexico, the Pacific Ocean, and the Straits of Florida, although it is now almost extinct in Florida waters. The greatest numbers are taken off the Mosquito Coast of Central America (Color Plate XVI).

The green turtle is a beautiful species, reaching a weight of more than 700 pounds, but averaging considerably less. In captivity it becomes quite tame and



AIR VIEW OF THE MIAMI AQUARIUM BUILDINGS, MIAMI BEACH, FLORIDA, OPENED TO THE PUBLIC JANUARY, 1921

thrives on turtle-grass, lettuce, and purslane, or "pusley." It will eat flesh, but lives much better on vegetable foods.

There is danger that these turtles will be wiped out of existence. They are far less numerous than in past seasons, due to the natives digging the eggs. The female turtle visits the beaches from April until June to deposit her eggs. This she does by digging a hole to a depth of from 14 to 18 inches in the sand, where she lays from a single egg to 200. On the fourteenth night from the first deposit—on what is known as the second crawl—she returns to lay more eggs close by her first nest.

Not only do the natives of the islands where the turtles crawl rob the nests, but they frequently catch the turtle after she has deposited her eggs, thus wiping out at one stroke both the mother and all her potential progeny.

BIRDS ARE ENEMIES OF THE GREEN TURTLE

Although statutes covering the protection of the turtles are written into the laws where these reptiles were formerly plentiful, the marauders continue their work of despoilation. Yet even now between 1,500 and 2,000 green turtles are brought annually to the Key West markets, the average weight being 130 pounds.

Man, although the greatest, is only one of the enemies of the turtle. When the young are hatched, they dig to the surface of the sand and immediately make toward the sea. Their instinct in locating the proper direction is unerring, and freshly hatched turtles, flipped like a coin and turned away from the sea, will wheel around and make directly for the salt water. The pelican and man-o'-war bird swallow the young as soon as they observe the small creatures on their way to the water, and if they reach the water they are harassed by their fellow sea-dwellers.

The hawks-bill, or shell turtle, is without question the most beautiful of sea turtles. It is the producer of the much-valued tortoise shell of commerce. This species is found in considerable numbers in the West Indies, where its members deposit their eggs from May to July. It is also distributed throughout the Gulf of Mexico, south to Brazil and the Straits of Florida, although it is now rare in the last-named section to an even greater extent than the green turtle. Large

quantities of the valuable shell are shipped every year, principally to Europe. The flesh is not as highly esteemed as that of the green turtle, but it is eaten in some localities (Color Plate XVI).

While the shell turtles are taken principally in large nets, into which they are driven, the natives of the West Indies have another method of catching them, known as "bullying." They drop over a sleeping turtle the "bully," an iron hoop four feet in diameter covered with a net like the crown of a hat. The turtle becomes entangled in the meshes and is then easily brought to the surface.

When alarmed, the turtle will hide its head, much as the ostrich is said to do, and then considers itself quite safe from observation. At the Miami Aquarium one of the turtle specimens has found a conveniently located hole in the rocks of its tank, and spends most of the time with its head thrust in the opening, its body dangling outside. Scores of times during the past season visitors have rushed to the office of the director to inform him that one of his prize specimens had gotten caught in a crevice and was strangling to death.

THE CRAWFISH, PRIZED COUSIN OF THE NORTHERN LOBSTER

Crustaceans play no mean part in the life of the sea. They cover a wide range in size, from the most minute of creatures to the great Japanese crab of the western Pacific, whose claws have a spread of 15 or 16 feet. High in the rank of the American crustaceans stands the crawfish, or spiny lobster (*Panulirus americanus*), of southern salt waters. It grows as large and is of even a more delicate flavor than its northern cousin. This species should not be confounded with the fresh-water crawfish, which is an entirely different form.

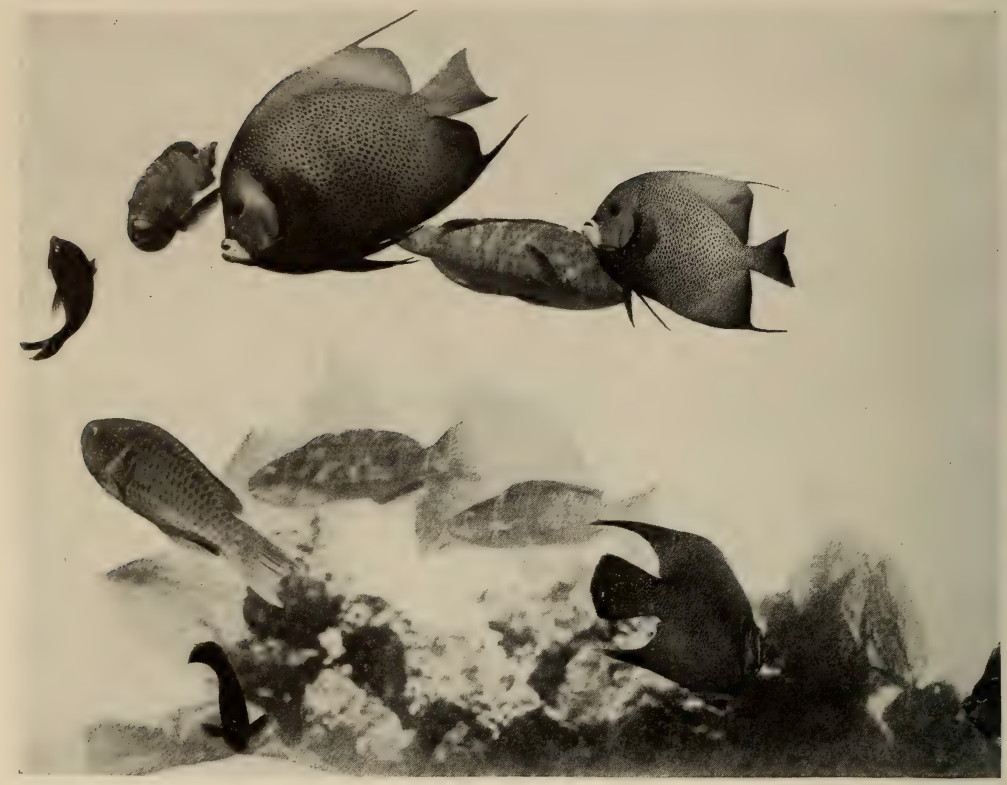
The *Panulirus americanus,* or southern lobster, is the largest of the crustaceans known to inhabit the Atlantic, the Mediterranean and Caribbean seas and is generally conceded to be the most toothsome. Reaching at times the extreme length of four feet, the crawfish provides an abundance of food material. Large numbers are shipped every year from the Florida markets. It dwells among the coral reefs and heads and is usually caught

CATCHING HIS BREAKFAST ON THE FLY

in traps baited with small fish, although "bullying" and spearing are also used to some extent (Color Plate XI).

The crawfish is not only a delicacy from the standpoint of human consumption, but is relished, too, by the inhabitants of the sea and is an excellent bait for most fish in the Florida waters. In the Miami Aquarium it is the staple food for nearly all kinds of fishes. Even the most purely herbivorous fishes eat, and appear to relish, the fine white flesh of the crawfish.

Crawfish are easily kept in an aquarium and make an interesting exhibit. This is true particularly of the female during the spawning season, when she is busy, almost constantly, combing her eggs in her efforts to give her prospective progeny a



Photograph by L. L. Mowbray

PEACOCKS OF THE SEA

Nature's paint brush has been lavish in tinting many of the warm sea fish. Here are seen in what approximates their natural habitat, alive and contented, the Black Angel, Blue Angel, Rainbow Parrot, and Blue Parrot, fish of fantastic shape and beautiful color.

fair start in the arduous life into which they are about to enter. The figure on the left, Plate XI, shows a specimen carrying her eggs. On the last leg may be noted a pincer, which is used in removing the dead eggs and debris which may adhere to the egg clusters. Large numbers of the eggs have been hatched and scientifically observed at the Miami Aquarium with a view to increasing this valuable food supply.

At the Aquarium many laboratory tests are made of the structure and composition of marine forms peculiar to local waters. Every stage in the life of fish is studied. Some interesting discoveries have been made, and others will undoubtedly follow, whereby man will benefit. More and more are the peoples of the earth looking to the sea for sustenance and even for leather substitutes and various other products. Science has helped much in garnering the sea's valuable materials for the use of the land's dominant animal.

Whether looked upon merely as potential food in a world in which food is becoming relatively scarcer; as interesting or beautiful creatures worthy of study and admiration, or as furnishing the material for a thrilling sport, the fish of the southern Gulf Stream are receiving more and more attention, from the all-too-small group of distinguished ichthyologists who specialize in this investigation.

Ages before Izaak Walton wrote of the fascination of catching fish only large enough to bob a tiny cork, the lure exerted by the finny tribe for sport-loving men had been conceded. When the hooking of small fresh-water creatures can bring its joys, is it any wonder that humble citizen and President alike grow enthusiastic over battles royal with rod and reel in which they match their skill with the great creatures of the Gulf Stream.

THE LAND OF THE BASQUES

Home of a Thrifty, Picturesque People, Who Take Pride in the Sobriquet, "The Yankees of Spain"

By Harry A. McBride

SPANISH trains, except on the few important direct routes, have little ways and mannerisms all their own. My first experience was on the *correo* from Barcelona to Bilbao, an express scheduled to leave at five in the morning and to arrive at eight in the morning of the following day; also an express that carried no sleeping-car.

The journey was scarcely begun when it became evident that the ordinary railway means of transportation on the Peninsula offered an excellent opportunity to sit and think and to smoke cigarettes. In America we have one car where smoking is indulged in, but in Spain there is only one car set aside where "to smoke is prohibited," and that car is as often as not empty.

This express made slightly more than fifteen miles an hour, and halted at innumerable stations where the neat little brick station-houses, almost exactly alike in construction, were the only signs of human habitation. I suppose there must have been a little town or village not more than one, or two, or three miles away; but Spanish railways are expert in the matter of successfully dodging the towns and stopping in a field at a very safe distance, the *locomotoras,* as it were, having not yet become city-broken.

At each stop there was plenty of time to get out, light a fresh cigarette, and take quite a promenade, while the engineer renewed his acquaintance with the hangers-on at the station and gave them all the latest Barcelona gossip.

THE LEISURELINESS OF SPANISH TRAINS DEMONSTRATED

A picturesque touch at many stations was the pair of *Guardias Civiles* standing stolidly by, carbines at their side, gravely overlooking the throng, in their Napoleonesque uniforms — triangular hat of polished black leather, gray tunic, with "Sam Brown" of white, a wide yellow belt, and gray trousers. This anti-bandit rural police is one of the most efficient and laudable institutions of Spain.

After something like two dozen of these stations had been safely negotiated and the stops becoming longer and longer in duration, it became evident that we were dropping considerably behind our schedule. I asked a fellow-traveler if we were likely to make up the lost time. The question seemed to daze him; then he said:

"Pues no, hombre, claro que no; pero que importa eso." Quite so; inconceivable that there could be any importance attached to such a small matter.

At last we had managed to become six hours behind time, and then the engineer evidently became thoroughly discouraged, for it was announced that we should arrive at Saragossa at about 19 o'clock; that this train would be taken off there, and that the passengers could proceed by the first train on the following day if they felt so disposed.

THE BASQUE PROVINCES RESEMBLE ANOTHER WORLD

The next day we ran out of Aragon and Navarre into another world, the Basque provinces—more hilly, more industrious, more modern—the New England of Spain. Even the train picked up spirit and arrived at each succeeding little station punctually, according to the unfailing station clock.

In the real Spanish provinces the peasants met on the highway never fail to greet the traveler with the salutation:

"Vaya Ud. con Dios."

This is a century-old request to God to be with you on your way. In the Basque provinces, however, it is changed to a brisk "Buenos"; they are so modern that they even abbreviate "good-day," and say only the first half of it.

The "Vascongados," as the Spaniards call them, or the "Euskaldunac," as they

SUBURBS OF BILBAO, ON THE WINDING RIVER NERVION

Even before the Nervion, on its way to the Bay of Biscay, reaches Bilbao, it has formed the habit of making graceful S's—winding in and out among the beautiful hills and mountains of Vizcaya.

Photographs by Casa Lux

VIEW OF THE NERVION RIVER AT SESTAO

The town of Sestao marks the last of the suburbs which make Bilbao the "Pittsburgh of Spain," with its iron mines, blast furnaces, and ore-loading steamers. The Nervion River then takes one more turn toward Portugalete, and the Bay of Biscay comes into view—out of the smoke and roar of industry into the sunshine of Spain again.

Photograph by Casa Lux

LOOKING DOWN INTO THE CENTER OF BASQUEDOM, THE CITY OF BILBAO, FROM THE CIRCLE OF MOUNTAINS WHICH SURROUNDS IT

Scattered here and there over all Basque landscapes are the small farms and neatly kept houses of the thrifty peasants. A delightful walk, though a somewhat tiring one, is from the city up to the Church of Begoña, in the right background—tiring because of the fact that much of the way is up short flights of steps.

Drawn by James M. Darley

A SKETCH MAP OF SPAIN AND THE BASQUE PROVINCES

In three small provinces of northern Spain—Guipúzcoa, Vizcaya, and Álava—live the Basques, who proudly claim to be the oldest unmixed race in Europe (see also "The Races of Europe," in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1918). Across the Spanish border is a French contingent of this race, whose most distinguished scion is Marshal Foch.

call themselves, are decidedly different. Even the Basque tongue (Euskara) is totally unintelligible to the Spaniard, and it is spoken almost exclusively by the peasants of the three little provinces of Guipúzcoa, Vizcaya, and Álava, though Spanish is used in the larger towns and cities. A Basque newspaper, and there are several of them, resembles Polish quite as much as it does Spanish.

"THE OLDEST UNMIXED RACE IN EUROPE"

The history of these "Yankees" of Spain, who proudly claim to be the oldest unmixed race in Europe, is a repetition of determined efforts to defend and retain the natural rights and liberties which they have enjoyed since time immemorial. They had certain *fueros,* or special privileges, to which they held through thick and thin, and way back in 1202 they stubbornly refused to become incorporated with the provinces of Leon, Navarre, and Castile until the privileges had been duly recognized and acknowledged.

These privileges gave the Basques, among other things, a republican constitution in their three little provinces, immunity from taxation and freedom from national military service, though they maintained certain forces of their own.

But the Vascongados, wearing the

Photograph by Casa Lux

A PANORAMA OF BILBAO FROM MONTE CABRAS

Looking down from highly cultivated fields to the Nervion River, with its iron foundries and shipbuilding yards. The Basques are not only progressive manufacturers, but also industrious and efficient agriculturists.

white cap of Don Carlos, took part in the "lost cause," and at the conclusion of the second Carlist War, in 1876, Alfonso XII, triumphant with victory, immediately attended to the matter of the *fueros* of the Basques, abrogating most of them in a peremptory manner. Thus the much-hated salt monopoly of the Spanish Government was introduced into the three provinces along with the more-hated tobacco monopoly and with the most-hated "quinta," or military conscription.

The provincial governments still retain, however, a semblance of their ancient independence. At the village of Guernica, a charming little place some nine miles from Bilbao, there is still pointed out, with great pride, the spot where stood the "Guernikako Arbola," the tree of Guernica, in a little plaza in front of the Casa de Juntas. It was under this oak tree that the Basque deputies met every two years before the abolition of their *fueros*.

There also remains a small remnant of the old military forces of the provinces—soldiers in blue blouses, red trousers, and soft red caps—who are now employed as customs and coast guards and in assisting the Guardia Civil as rural police. They are called *miñones*.

BILBAO, THE PITTSBURGH OF SPAIN

Picture a small, round valley nestling among wondrous green hills, some of which are almost worthy of the name of mountains, with a river carefully making a letter S or two in order to enter this beautiful stronghold. That is the site of Bilbao, with its hundred thousand souls, the largest Basque city and the second seaport of Spain.

The river is the Nervion, which has been canalized from the city to the Bay of Biscay, eight miles distant, so that seagoing merchant vessels come to town, passing the Ayuntamiento, the beautiful municipal building, on their way, and dropping anchor within a stone's throw of the Teatro Arriga, one of the finest theaters in Spain.

The hills encircle the city so closely that the ribbons of railways seeking entry from north, east, south, and west attain their end only by plunging into smoky tunnels.

CHILDREN IN THE VIZCAYAN NATIVE DRESS

Photographs by Casa Lux

STREET SCENE IN A BASQUE FISHING VILLAGE

The fish of the Basque coast are reputed to be as excellent as any caught in European waters. The tunny-fish and sardines are the most numerous species, and all Atlantic vessels steaming toward Bilbao pass fleet after fleet of the little fishing schooners, both sail and steam, dancing madly upon the rough waters of the Bay of Biscay.

A MOUNTAIN VILLAGE IN ASTURIAS, WEST OF THE BASQUE PROVINCES

Photographs from Pio Noriega

A MASS FOR THE SHEPHERDS IN THE PICOS DE EUROPA

The Cantabrian mountain range, extending from the Pyrenees along northern Spain, attains almost an Alpine altitude between Santander and Oviedo, in the Asturian provinces. The snow-capped mountains are called Pico or Peñas de Europa, their highest point being 8,668 feet. The highest altitude attained by the range in the Basque provinces is about 5,000 feet.

Photograph by Casa Lux

A CARD PARTY IN THE DRAWING-ROOM STABLE OF A BASQUE HOME

In the summer time the peasant families and their guests spend the heat of the day on the cool first floor of their homes—that portion of the establishment occupied at night by the domestic animals. Note the high cart in the right background.

I have likened the Basque provinces to New England. Now there must arise a slight inconsistency, perhaps, because Bilbao itself is certainly the "Pittsburgh" of Spain. Along the Nervion, between the city and the sea, are some of the world's most famous iron deposits. They were known in the middle ages—so much so, in fact, that Elizabethan writers used the term "bilbo" for rapier, and no less an authority than Shakespeare causes his Falstaff, in the "Merry Wives of Windsor," to speak of his condition in the buck-basket as "compassed, like a good bilbo, in the circumference of a peck, hilt to point, heel to head."

It is largely during the last three decades, however, that vast exploitation has taken place; and now the river is lined with freighters loading ore for Newcastle or for Rotterdam, where it is transhipped into Rhine barges and carried to Krupps and other German iron and steel makers.

But not all of this Vizcayan wealth is exported in its natural state. Basque energy has caused the erection of smelting plants along the river, where steel rails and ship plates are produced. The rails explain why these provinces lead in the matter of Spanish railways, and the steel plates why Bilbao has become Spain's chief shipbuilding center.

NO RESENTMENT AGAINST AMERICA

As far back as 1897 the Bilbao yards launched a Spanish cruiser which a few months later, as a unit of Cervera's fleet at Santiago, was destroyed.

Photograph by Casa Lux

THE MEN OF BASQUE LAND ENJOY THEIR CARD GAME IN THE OPEN

"What did you folks think when that cruiser sailed forth from the Nervion toward Cuba to fight the Norte-Americanos?" I once asked an old Basque peasant.

"Well, hombre," he replied, "we were all about to pack our belongings to move over to our new colony north of Mexico. Our newspapers led us to believe it would be a one-sided affair, and it was—pero al otro lado."

"I don't suppose Yankees are very popular in these parts on that account," I ventured, having known the old fellow for some time.

"Why not? You really did Spain a great favor in taking away Cuba and the Philippines—millstones around our necks."

I thought it well to check up on that latter statement, and found it to be the general opinion. I should say that most Spaniards feel today that the country has a better chance for development minus its colonial possessions.

The Nervion, crossed by several ornamental bridges, divides Bilbao into two almost equal parts, leaving on one side the old town, with its narrow streets—so narrow that wheeled traffic can be used only in two or three of them—and on the opposite side the new modern town, with its wide Gran Via and many other tree-lined avenues.

THE ARENAL, CENTER OF CAFÉ LIFE

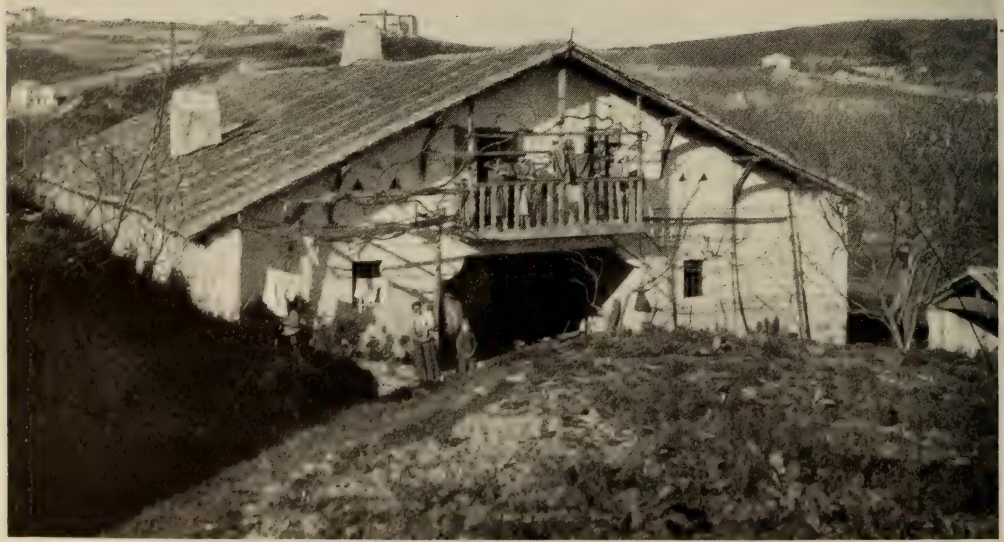
A large plaza in the old town at the foot of the principal bridge, called the Arenal, is the focus of the city's activity. It is here that the evening promenades take place, while a military band often renders real music for the occasion. The Arenal is also the center of the café life, with chairs and tables taking up most of what should be the sidewalk.

The average Basques of the cities and towns are like all other inhabitants of the Peninsula in their love for cafés; but in Spain this is a male institution, a woman being seldom seen therein, in this respect unlike the cafés of France.

Immediately after luncheon and again immediately after dinner, in the evening, husbands, fathers, and brothers retire post haste to the café, meet two or three friends, secure a marble-topped table, and clap their hands loudly for the *camarero*. He hurries up to the table in shirt sleeves

A TYPICAL BASQUE FARM-HOUSE, WITH A HEAVY TWO-WHEELED CART IN THE FOREGROUND

So tempestuous are the winds along the shores of the Bay of Biscay that few of the peasant houses have chimneys. In their stead round holes to emit smoke are cut in the wall beneath the eaves, as here shown.



Photographs by Casa Lux

THE VILLAGE OF PLENCIA, ON THE ROCKY BISCAY COAST

The green hills and fascinating outlook over choppy blue waters have attracted many Bilbao people to this village, where they have summer villas.

Photograph by Casa Lux

A BULL-FIGHT IN A BASQUE VILLAGE

Even the villages in Spain must have at least one bull-fight every year, on the festival of the patron saint of the locality. The arena, or "plaza de toros," in the small towns, is often rather crudely improvised, however. The national sport is as popular in the Basque provinces as elsewhere in Spain. This photograph shows the long blouses worn by Basque laborers.

and long white apron and always receives the same order:

"Coffee, very black—un anisette—and a set of dominoes."

The cafés are often large, and when they are crowded, at the popular hours, with every patron slapping dominoes down on marble-topped tables with what force he can muster, talking in excited tones, smoking cigarettes, and with waiters crying their orders, there reigns what might most properly be called confusion. As it cannot be heard above the other noises, it is scarcely necessary to mention that there is often an orchestra rendering faultlessly some of the world's most classical selections.

After an hour or two at the cafés in the evening, the male of the Basque species hies himself to the theater, this being another form of amusement in which the women participate little except on "dias de moda." He purchases a seat for the "session of 10 o'clock," which performance lasts until considerably past midnight. Thus it is well on toward sun-up before the city loses itself in repose.

HOW BILBAO WAKES UP AND GOES TO WORK

When most northern Spanish cities wake up in the morning certain fixed and recognized noises are heard, certain events transpire, and certain movements of the population take place, and in Spain somehow these little incidents differ considerably from similar ones taking place at the same hour in other countries.

The whistle of locomotives is heard announcing the departure of the early trains, and in Spain the best trains, apparently with fixed intent, manage to depart at about 5 o'clock. Tiny electric cars rumble through narrow streets and across the plazas, under the dusty palm trees, tinkling their little brass bells, or perhaps they haven't any bell at all, the conductor simply blowing from time to time a small tin horn as sign of warning.

Photograph by Casa Lux

LITTLE "SEÑORITAS" OF THE PEASANT CLASS IN BASQUE COSTUMES

The worker appears on the streets with his long blue blouse hanging to the knees, hurrying along noiselessly in his *alpargatas,* like canvas tennis shoes with soles of coiled rope, and his *boina,* a tiny blue cap with no visor, like a small tam-o'-shanter, with a piece of string an inch long replacing the pompon, set at a rakish angle on his head.

Generally there is also a shawl, nearly as large as a steamer rug and of about the same color scheme, rolled up on his shoulders, with a generous piece across the lower part of the face to protect him against the possibility of inhaling pure fresh air.

Seabirds, attracted the night before by the lights of the city, soar over the red tiles of the flat roofs, and, finally tiring of city life, spread their wings for the flight out to their accustomed haunts over the wild Bay of Biscay.

In the older parts of town the iron curtain covering both door and single window of the little stores, taverns, and wine shops of the poorer classes is pushed up with a rattle and the place is then open for business. The church bells call the faithful to early mass, and among them are many women garbed in black, further intensified by the black mantilla over head and shoulders, who slip like shadows through the early morning light.

Bread women call at doors, leaving the large rolls, or panecillos, which, with a generous bowl of coffee and hot milk (half-and-half), form the usual menu for the day's first repast of rich and poor alike. The servant girls, also with alpargatas on their feet and black shawls over their heads, appear, basket on arm, on their way to market for the day's purchases.

Movement commences along the waterfront, where the rattle of donkey-engine is heard, the clanking of large chains, and the hoarse cries of the second mates starting their gangs at the day's work of cargo-handling.

THE "ANGULERO" BURNS THE MIDNIGHT OIL

All that takes place at any of the Spanish cities on the "Mar Cantabrico," as the Bay of Biscay is called in the mother tongue. But at Bilbao there are two incidents that occur in the early morning which, as far as I have been able to ascertain, are unique to this, the largest of the Basque cities of Spain.

Number one. The oil lamps of the *anguleros* are extinguished. Now, anguleros are fishermen who since midnight have been engaged in a peculiar branch of the fisherman's art. They have been catching *angulas,* and angulas, in turn, are a very peculiar brand of fish—little white, almost transparent worms (perhaps it would sound better to call them miniature eels), only two inches long. When a batch of them is fried, however, in olive oil and served in an earthenware dish, with the oil still popping when brought to the table, most connoisseurs will agree that there is method in the anguleros' apparent madness.

This delicacy inhabits the river Nervion and is caught along the stone walls of the quays, being attracted into nets by the fishermen's oil lamps. This helpless little morsel of seafood labors under the scientist's formidable appellation of *Marœnidœ.*

Number two. The shrieks of barefooted, illy-clothed women stevedores are heard.

This requires the explanation that Bilbao, the most important port of Spain after Barcelona, derives its prominence from the heavy outward-bound traffic in iron ore from the near-by mines and the correspondingly heavy imports of coals from Newcastle to furnish fuel for the many Basque industries.

The iron ore is loaded with modern equipment along the river, but the coal is often unloaded by hand or, perhaps, to be more explicit, by head. Women almost exclusively are employed in this dainty occupation. Every day a continuous line is to be seen moving up one gang-plank, with bushel-basket in hand, and down another to the coal hills on shore, with a heaping basketful of coal balanced on each head.

When these toilers gather, shortly after daybreak, to begin work, there is a great row that has to do with preferred places in the line, there being some gang-planks slightly nearer to the coal heaps than others.

In addition to the coal-ships along Bilbao's waterfront are also to be seen freighters flying astern the red and blue banner of Norway. These carriers bring immense quantities of *bacalao,* cod preserved in great chunks like salt pork, which forms one of the chief articles of food, not only in the Basque provinces, but also in Asturias and Galicia.

A MIDDAY MEAL IN A PEASANT HOME

I remember once taking a day's excursion on foot with two Bilbao friends out into the beautiful country-side beyond the famous Church of Begoña. Past midday, after a morning of blazing heat, we came to a little stone farm-house upon a pretty green hill.

The omnipresent iron balcony was in its usual place over the front entrance, but fastened to it was the small branch of a tree, indicating that refreshments were to be obtained within by the road-weary traveler.

Passing around to the back of the house, we were greeted by a fine old Basque peasant and his señora, or, as he would call her, his *mujer* (woman). We were seated at a wooden table under a plum tree, and there ensued what to me was an unintelligible conversation in Euskara.

Photograph by Casa Lux

A PEASANT WOMAN OF THE BASQUE COUNTRY

She is wearing the rope-soled shoes called *alpargatas.*

While we awaited results, I noted that the ground floor of the house was surrounded by a stone wall, open at the back, which formed the support for the second floor. The ground floor was the home of the steers, pigs, and chickens, whereas the human members of the family lived above; but the small, simply-furnished rooms of the peasant's quarters were spotlessly clean.

The farmer's son came in from the fields, walking slowly alongside a pair of steers harnessed to a two-wheeled cart, the popular type of farm-wagon.

At this juncture the mujer appeared with a large earthenware dish of bacalao,

Photograph from Pio Noriega

A MOUNTAIN HIGHWAY IN THE BASQUE PROVINCES

The three Basque provinces have an area equal to about twice that of the State of Rhode Island, with a population slightly in excess of 700,000. A peculiar feature of Spanish railways is that they have a different gauge from those of France, for strategical reasons. However, plans were ordered drawn several years ago for a double-line standard gauge railway from Madrid to the French border.

Photograph from Pio Noriega

TOWER OF A FIFTEENTH CENTURY CASTLE IN POTES

This quaint little Asturian village is in the heart of the "Cantabrian Alps," not far from the city of Santander.

Photograph by Casa Lux

A HOUSE WITH AL FRESCO PAINTINGS IN GUERNICA

Guernica was the seat of the diet of Vizcaya, where the Basque deputies met every two years. It still retains several interesting architectural relics of the days when the Basque provinces were independent.

Photograph by Casa Lux

HERALDS OF THE TOWN HALL OF BILBAO

Like the "beef-eaters" of the Tower of London and the picturesque Swiss Guards of the Vatican, these heralds retain their mediæval costumes. Note the coat of arms of Bilbao which they wear.

boiled with just a touch of garlic and covered with delicious scarlet sweet peppers, while around the sides of the dish were *garbanzos,* giant chick-peas of fine savor.

Before each of us was set a jug of *chacoli,* an excellent white wine of peasant make. For dessert there were luscious red plums of Vizcaya. It was a repast that will linger long in my memory.

One derives a false picture of this center of Basquedom unless the little eight-mile side-trip from Bilbao down to the sea is taken. Paralleling each side of the river is an electric tramway, and paralleling each of these in turn is a steam railway.

Town after town is to be seen on the way. Along the left bank of the Nervion shipbuilding yards are succeeded by immense iron foundries and smelters, and dozens of steamers are tied up alongside these industrial plants, all combining to fill the air with the smoke of man's activities.

The pretty green hillsides far beyond the river are marred here and there by patches of reddish brown color, where, in the distance, can be seen the puff of the little locomotives of the ore trains, and occasionally the rumble of a dynamite explosion is heard. These are the mines, and from many of them, stretching for miles through the air, to the loading berths on the river, are aërial cables, to which are fastened buckets full of red ore moving continually from mine to river, with parallel cables carrying back the "empties" to the far-away brown patches on the hillside.

THE "FLYING FERRY"

The river winds its way between these rich hills, and finally, rounding a corner, the sea comes suddenly into view. The strong sea breezes of the Biscay blow away the smudgy fog of industry, and one emerges again into Sunny Spain.

At each side of the river mouth is a town—Portugalete on the left and Las Arenas on the right. A beautiful and unusual bridge, connecting the two, forms a fitting monument to mark the union of the Nervion with the waters of the Atlantic. It is called the Puente Trasbordador (see illustration, page 84).

On each river edge is a great tower of steel, something like a wireless tower, but more massive, over two hundred feet in height. These towers support a light iron bridge one hundred and fifty feet above the river, under which the largest steamers pass and repass night and day. From this bridge is suspended a "flying ferry" supported by a network of fine wire, which is pulled back and forth across the river. It hangs to within a few feet of the water.

We decided to cross one Sunday when there was a festival at Portugalete. Approaching the window, we demanded:

"Un billete, to go and to return, how much?"

"Dos perros gordos."

Two "fat dogs," as the Spaniards call their large ten-centime pieces of copper.

Then we crowded onto the ferry with some seventy laughing men and women bound for the festivities on the opposite side. The whistle blew, the bell rang, the iron gate clanged shut, and we moved smoothly out over the river through the air, as it were. The opposite shore was reached in one minute, but it was a rather delightful little minute at that.

Photograph by Casa Lux

A MEDIEVAL TOWER IN THE BASQUE COUNTRY, WITH MODERN CORRUGATED IRON SHEDS IN THE FOREGROUND

Portugalete has narrow streets, and its balconied houses stretch picturesquely up the hillside, while at the top is an enchanting little Gothic church, which is always the way in Spanish towns. They always seem to cluster around a church or two for protection. Indeed, in Bilbao, there are no less than 75 of these protectors.

Las Arenas, opposite Portugalete, is a modern village of seashore villas which has become popular as a summer resort. Here the Club Maritimo has its pleasant club-house, overlooking the harbor entrance, where the youths of Bilbao go in the afternoon to drink chocolate, dance, and play at *caballitos,* which is better known by its French appellation, "petits chevaux."

THE KING MAKES AN ANNUAL VISIT FOR THE YACHT RACES

The King comes nearly every summer to the yacht races and causes this little outing place to be for a few days the social center of the kingdom. He generally goes over to picturesque Portugalete during his stay in this section.

Photograph from Pio Noriega

A PANORAMIC VIEW OF THE HISTORIC VALLEY OF COVADONGA, FROM WHICH VANTAGE POINT THE ASTURIANS BEGAN THE RECONQUEST OF SPAIN FROM THE MOORS

Here Pelayo, the Goth, took refuge, with three hundred devoted followers, and during the first quarter of the eighth century waged relentless warfare against the followers of Mahomet. The title of "Count of Covadonga" is assumed by the King of Spain today.

There are few harbors more beautiful in setting than this, with one breakwater of stone stretching far out into the sea from the Portugalete side and another, of equal length, from the Las Arenas side. Within the breakwaters are vessels riding at anchor on the deep blue water, a few steamers and many small fishing schooners, for the fresh fish of the Basque Sea are numbered high in the record of fish excellence.

THE SARDINE WOMEN MAKE A STRIKING PICTURE

The sardines, according to local repute, are better than those of Bordeaux, and I am not inclined in this instance to question the correctness of local reputation. One of the unique little pictures of the Basque towns on the sea is that of the barefooted sardine women, walking with infinite and unaffected grace through narrow streets of stone flagging, with great square wooden trays balanced on their heads. On the trays are hundreds of silvery fresh sardines laid out in neat rows. And the women cry, "Sardinas, sardinas vivas!" indicating that their wares are still alive.

They tell a story in Portugalete about one of the visits of the royal family at yacht-racing time, when a large crowd was watching the arrival of their popular King and Queen. Suddenly some one shouted, "Viva el Rey!"

"Viva! Viva!!" echoed the crowd in a mighty voice.

The yell-master continued, "Viva la Reina!"

"Viva! Viva!!" came the answering volley from a thousand throats.

The leader then submitted for approval, "Viva España!"

"Viva! Viva!!" came the prompt reply.

At this juncture a sardine woman turned the corner. Her voice had the same quality of carrying powers as that of the popular yell-master, as she cried, "Sardinas, vivas sardinas!" and before the excited throng could restrain itself it had roared forth its approving "Viva! Viva!!"

EACH OF SPAIN'S 49 PROVINCES HAS ITS DISTINCTIVE INDIVIDUALITY

For administrative purposes Spain is divided into forty-nine districts or provinces. Regionalism is so strong that one may almost continue, and state that there are also forty-nine national languages, forty-nine national costumes, forty-nine national dances, and, last but by no means least, forty-nine national dishes.

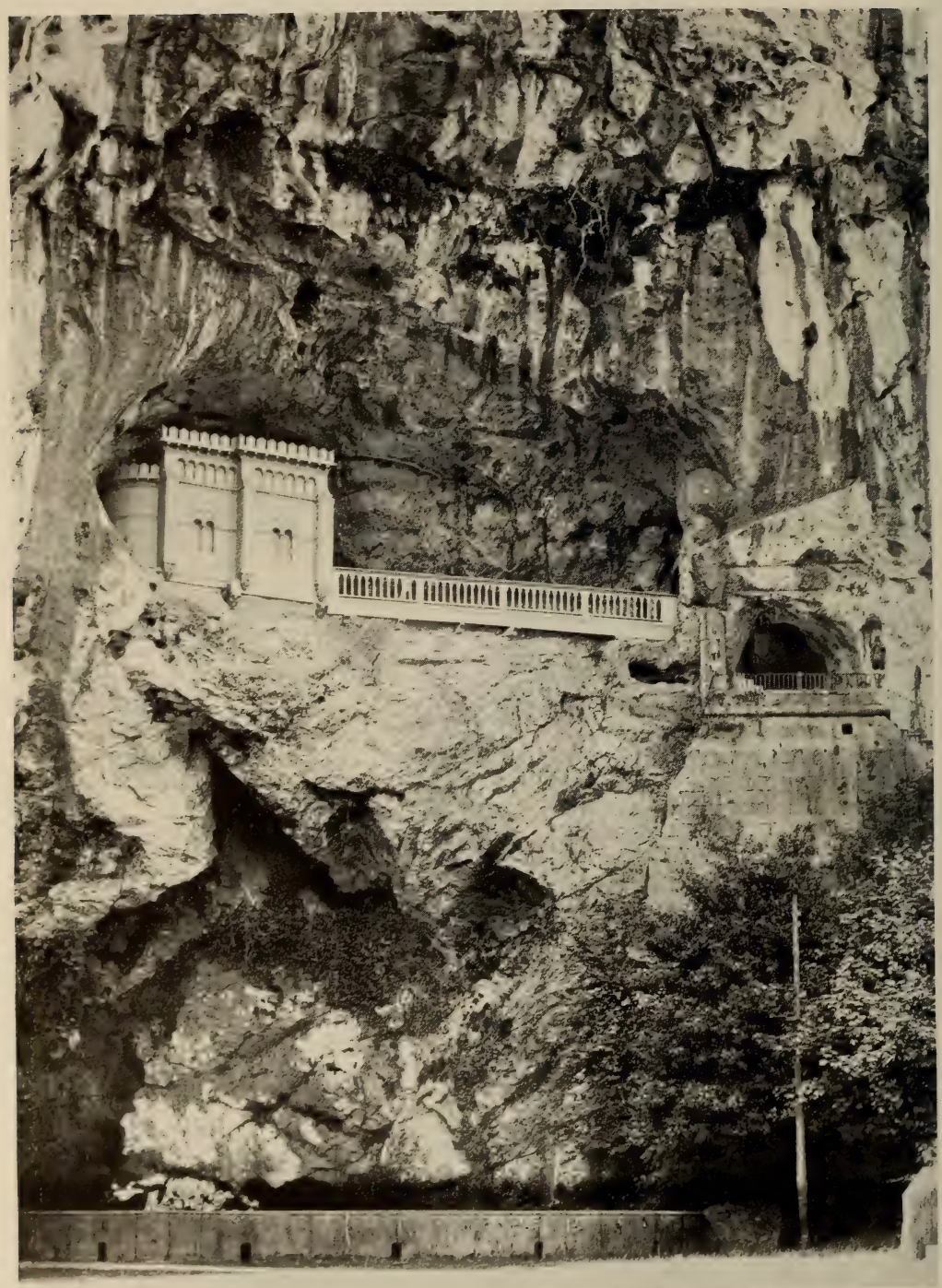
This would, perhaps, be a slight exaggeration, but the fact remains that the inhabitants of each district differ noticeably in characteristics from all the others. A man from Barcelona is first a Catalan and second a Spaniard. Likewise an inhabitant of Coruña is less Spanish than Gallego, and a person from Bilbao places his Basque nationality before his Spanish adherence, and so on.

Thus, the Bilbaino holds that no dish can equal in excellence his *bacalao vizcaino,* and the citizen of Vigo turns up his nose at all foods except his own native *pote gallego,* a concoction of potato and cabbage boiled in water with lard and eaten with bread and garlic. The Valencian has his *arroz valenciano,* which is really excellent—rice cooked in oil, to which tender bits of meat and sweet peppers are added. The proud Castilian sticks through thick and thin to the *puchero,* the Sevillaño to his beloved *gazpacho.*

THE BASQUES ARE GREAT BALL-PLAYERS—NOT BASEBALL, HOWEVER

This spirit of regionalism must at one time have divided in slight degree even the three Basque provinces, the smallest in Spain. It is said that in the olden days the men of Vizcaya wore blue caps, those in Guipúzcoa preferred red ones, whereas the men in Álava were often to be seen in white headgear, the caps, or "boinas," in each case being precisely the same in style and shape. In recent years, at any rate, this distinction has entirely disappeared and blue seems to be the *dernier cri* as to color for men's headwear in all three provinces.

Among other qualities of excellence, the Basques are the leading athletes in Spain. They supply a goodly number of *torreros* for the bull ring, and no one, I believe, will dispute the fact that even a bull-fighter must be an athlete in pretty nearly the pink of condition. Basque prowess in the arena is placed first because of its preëminence as a sport of the Spanish nation, but the really noteworthy



Photograph from Pio Noriega

THE GROTTO OF COVADONGA (SEE ALSO PAGE 80)

It was here that King Pelayo withstood the onslaughts of Al-Kamak, the Moor. A sarcophagus within the chapel is supposed to contain the remains of the Christian hero as well as those of his wife, Gandiosa, and his sister, Hormesinda. The occupation of Spain by the Moors is still evidenced here and there, even in the northern provinces, by bits of architecture, watch-towers, and names of villages and streets.

excellence of the Basque sportsman lies in no more nor less than playing ball. He is a born ball-player and knows the game from all angles—factory hand, miner, and manager alike.

Alas, it is not baseball, but the great Basque ball game, *juego de pelota*—democratic and popular as is the national game in America. One sees the boys in the villages hard at it, and in the cities the fond Basque parent, like the American, is sometimes caused a violent shock by the smashing of a pane of glass in the dining-room, caused by the unwelcome entry of a pelota, a little smaller and a little harder than a baseball.

PELOTA HAS MADE ITS WAY TO SPANISH AMERICA

Pelota excels in its professional form and has become so popular that games may be seen not only in the Basque provinces, but also in Barcelona, Madrid, and even in Havana and Buenos Aires, the players being of Basque parentage in nearly every case.

The game is, perhaps, a more violent form of sport than baseball, and in many respects closely resembles squash rackets. Only four players are engaged—two on a side—dressed in white trousers, white blouse, and white shoes, one side wearing wide red sashes of silk around the waist and the other side blue.

The courts, called *frontones,* are 36 feet wide and 210 feet long, with floors of cement and with a high cement wall at one end and along one side.

Each player wears a sort of cestus on the right hand, firmly fastened to the forearm, which constitutes the racket or bat.

The ball is thrown from the curved cestus, at terrific speed, against the front wall, so that it usually rebounds at an angle against the side wall before touching the floor, and, as in rackets, the players alternate in returning the throw. The game becomes so rapid in action at times that the ball is scarcely visible to the "pelota fans" along the side line and can be followed only by the sharp crack with which it hits the front wall.

Each failure to return the ball counts a point to the opposite team, but they do not call it a point; that would have no Spanish touch; it is called by them a *tanto,* in other words, a "so-much."

Photograph by Casa Lux

A MEDIEVAL CROSS WITH OLD AND NEW TESTAMENT CARVINGS: DURANGO

The quaint old town of Durango is situated in a wide upland valley inclosed by lofty mountains. Its chief pride is this cross and San Pedro de Tavira, one of the oldest churches in the Basque provinces.

Photograph by Casa Lux

THE VIZCAYA BRIDGE BETWEEN LAS ARENAS AND PORTUGALETE

This is the "Puente Trasbordador," under which the ocean-going steamers pass on their way up the Nervion River to Bilbao. A "flying ferry" hung from a high cross-bridge, carries as many as seventy persons on one trip across to Portugalete, on the opposite bank. There is a bridge of similar construction at Duluth and another at Marseille.

Another popular sport in the Basque provinces is one confined to the iron mining regions—that of stone-drilling. Only the strongest of miners are physically capable of engaging in these contests of muscular force, and there have been many instances of death from overexertion during these battles of human energy thrown against large blocks of rock.

It would be difficult to find a sport anywhere in the world that so taxes the power of endurance of the participants. It is in many ways a cruel spectacle. I once mentioned this to a Basque, and his scornful reply was:

"Yes, perhaps; but not half so cruel as your prize-fights in America."

HOW THE STONE DRILLING CONTESTS ARE STAGED

These games are the occasion for great festivities in the mining towns. The champion from one little mining town will be sent to combat against the native son of another, and the betting, as well as the feeling, runs high.

The home champion, generally a giant in stature, has been the popular hero of his district for weeks. In the Basque mining sections, as in those of other countries, wages are high, and much of it is thrown away in drinking and gambling. Thus it happens that the hero spends the days preceding the *fiesta* in consuming the fine wines, champagne, and heavy dinners thrust upon him by his admirers rather than in intensive training, the idea apparently being that he cannot fail if he has been generously fed upon the fat of the land for a sufficient period.

The day arrives. The invading *barrenador,* or stone-driller, enters the town, supported by most of the male population of his neighborhood with pockets full of *duros* to be placed upon their favorite.

The town dignitaries appear upon one of the balconies of a prominent house on the small, carefully swept plaza. The other balconies all round the little square are soon filled, chiefly with women, while the men crowd onto the plaza itself, as close as possible to the rope which marks off the rectangle in the center where the contest is to take place.

Great excitement is in the air as the last bets are placed. Two pairs of large oxen, straining at every step, slowly drag into the open space enormous blocks of stone, leaving behind them tracks of heavily packed earth.

This is a diversion of primitive nature, probably so popular because all of the spectators are those who are faced with the dire necessity of earning their daily bread by the hardest sort of physical toil. To give "tone" to the occasion, there is first a short contest of wood-hewers, called in the Basque tongue *aizkoralaris,* who chop through logs laid out in the plaza. This, however, is merely an hors-d'oeuvre.

Then exclamations of excited anticipation are heard; the crowd presses a little closer to the roped arena.

The two contestants appear and are loudly applauded as they remove caps and alpargatas and as each, barefooted, climbs upon his block of rock.

Each rock has marked upon its top surface eight rings to indicate where the holes are to be drilled. The contest lasts two hours, and the winner is he who either has completed the perforations of the eight holes or who has advanced farther toward that end.

The barrenadores, standing upright on the blocks of stone, place their heels together, the feet forming a right angle close to the indicated marking on the rock. Between these bare feet the heavy iron bar in their powerful hands must rise and fall, each stroke deepening the hole.

The slightest deviation in aim of any stroke, with the Herculean force of the barrenador behind it, would surely destroy a foot. Little fear of such an accident, however, for their arms move up and down with the precision of a machine.

CONTENDERS ARE COACHED BY "GODFATHERS"

Each of the contenders chooses a friend or two to act as coaches. These "godfathers," as they are called, stand near their champion, moving their bodies up and down like a pump handle, serving as a pendulum to regulate the strokes of the steel bar. They signal each blow with a "Haup—haup."

They tire sooner than the barrenadores themselves, and have to be replaced several times during the monotonous two hours.

© E. M. Newman

AT SAN SEBASTIAN, THE MONTE CARLO OF SPAIN

Its bathing beaches and casino attract the aristocracy from all parts of the Peninsula to the second city of the Basque provinces. Monte Igueldo projects abruptly out into the Bay of Biscay from one of the beaches. Its ascent is made easily by means of a cable railway. On its summit is an abandoned lighthouse constructed in 1778.

Enthusiasm is at high pitch, however, during the last quarter-hour. The competitor who is seen to be losing is jeered by the adherents of his winning opponent, while his own villagers, whose combined wagers on his victory may aggregate sixty thousand duros (dollars), hurl vile epithets at their now disgraced hero.

"More force, you pig!"

"May the thief die!"

The contest usually ends in a debacle. High words, and sometimes a free-for-all fight ensues.

The winner is borne away on his friends' shoulders to a nearby tavern, where wine will flow freely. The poor defeated barrenador slinks off alone, anxious to avoid the eye of man; in all probability he will never return to the village where yesterday he was the most popular inhabitant.

THE ARRESKU, THE FAMOUS BASQUE DANCE

In the early evening, after a festival of any kind, dancing generally takes place, in open air, of course, as often as not in the village plaza. The students and other youths from the cities love to attend the village fêtes. Most interest is taken in the *arresku,* the great dance of the Basques. I have many times been instinctively fascinated in watching this spectacle, which slightly resembles a Polish mazurka.

The sound of the pipe and tabor are heard in the lively cadences of the arresku. An expert dancer, master of ceremonies, as it were, advances in the space set aside for the dancing. Throwing his boina on the ground, he moves with a series of minute, rapid and intricate steps toward the woman he has chosen to be the "queen of the ball." And no Basque woman, no matter how high her social standing, will refuse this honor. Señoras of noble rank have been seen taking part in this ceremonious dance opposite to peasant and sailor.

The arresku is all a mass of intricate movements of feet, body, and arms, even the fingers playing their part, the participants advancing and retreating. Always the man is in the foreground, and he simply seems to talk with his feet, while scarcely the finger tips of the partners touch during the whole dance.

SAN SEBASTIAN LACKS BASQUE ATMOSPHERE

In a description of the "New England of Spain" some mention must be made of San Sebastian, the second city in the Basque provinces, but the least Basque in characteristics. It is a modern town on the Bay of Biscay only a few miles from the French frontier, the summer residence of the royal family, and the most popular of Spanish resorts. It has a fine casino and an unrivaled bathing beach. Indeed, in many ways, San Sebastian is a serious rival of Monte Carlo.

The last night of my last visit to Spain was spent at this famous watering place. It was in winter; hence many shops and most hotels were closed. The casino offered the only amusement, and there were two friends playing at "trente et quarente" who attracted my attention—one a Castilian from Madrid, the other a Catalan from Barcelona.

Even in the excitement of gambling, the marked regionalism of Spain could not be forgotten. They would play a while, then retire to the "bar Americano" to quench their thirst and to enter into a loud discussion as to why or why not the government should grant "autonomia" to the provinces of Catalonia. Their discussion was much more heated than their cognac. Then they would lock arms and return to the gambling tables.

INDEX FOR JULY-DECEMBER, 1921, VOLUME READY

Index for Volume XL (July-December, 1921) will be mailed to members upon request.

A ROUGH DAY IN THE BAY OF BISCAY

Many a "rookie" in our new merchant marine well remembers his first storm at sea and his sudden loss of interest in all forms of nourishment, when walls of green water came tumbling on board, the ship wallowing till her ribs cracked.

THE GEOGRAPHY OF OUR FOREIGN TRADE

By Frederick Simpich

Author of "Where Adam and Eve Lived," "Mystic Nedjef, the Shia Mecca," "The Rise of the New Arab Nation," "Along Our Side of the Mexican Border," "Every-Day Life in Afghanistan," etc.

OCEAN trade began on that eventful day when restless, primitive man, piling his surplus grain and skins into his *baggala,* hoisted his clumsy mat sail and put to sea, venturing away to visit and barter for the first time on that distant, unknown isle whose peaks he could discern on clear days from the heights of his own coast home.

What a picture to conjure with—that first "sailing day"!

How fascinating to visualize that mud-walled village sprawling along a palm-fringed coast,* with a wailing group of half-nude, shapely brown women, bizarre in jangling anklets, shell beads, and hammered earrings, calling wildly to the stars to save their men from the perils of the sea; timid, wondering children; bearded, turbanned old croakers of the tribe sagely predicting calamity for the foolhardy voyageurs.

Then followed weeks of despair among the wives, and finally the triumphal return of the sailors, their crude craft piled high with strange, delicious new foods and odd woven stuffs. Perhaps there were Bahrein pearls, amber, and beautiful slave girls for the master's harem, and thrilling tales to tell of great adventure, new gods and new life on far shores—*the beginnings of geography!*

THE SEA-TRADER IS THE PRACTICAL GEOGRAPHER

To me, sea-traders have always seemed such practical geographers.

Columbus and Magellan were the kings of explorers, of course; Drake and Hawkins were gentlemanly pirates; Peary and Scott courageous scientists, whom the world is proud to honor.

But the sea-trader! Whether he runs his own foul little tramp schooner or sits in New York or London and directs a great merchant fleet, he must know not only his map, his ports, his winds, currents, and climates, but his people, their politics, their products, needs, whims and manners, their language and their prejudices.

How many of the once blank spaces on the map have been filled in for us, not only as to the names and locations of towns, mountains, and rivers, but also as regards the true characteristics of a people, by the world's great traders, like the fur-buyers and the tea merchants! How intimately many a Yankee trade scout knows his world map!

THE ROMANCE OF GEOGRAPHY IN THE PURCHASE OF HAIR

In Hamburg recently I met a breezy man who owns a brush factory in Brooklyn.

"We make brushes for teeth, typewriters, hats, horses, or shoes, or to paint anything from a miniature to a barn," he told me. "I'm off now to Russia to look for pigs' bristles or horses' tails. Get in? Of course! I'll get in by Riga or Odessa, unless the Bolsheviks drive me back. If they do, I'll go around by Vladivostok, or go up to Peking and try to work in via Kalgan and Urga.

"Last week I had to hire an airplane to get to Warsaw, and maybe I'll have to do it again. But I'll get into Russia somehow.

"The boys in our New York office call me the Russian Hair Hound, because if there's any good, stiff hair flying loose anywhere between Baikal and the Baltic, I always manage to grab it and bring it back to Brooklyn to make brushes."

The names of foreign places mean more to such a man than mere red dots and circles on the map. Geography to him is more than the science of places, more than a mere answer to the geographic question, "Where?"

THE TRADER KNOWS HIS WORLD CUSTOMER

Men like the "Hair Hound"—and there's a host of his sort among our modern traders and exporters—can do more than "bound" Burma or name the towns in Turkestan. They can tell you what, and

* Tradition says that the Phœnicians or the tribes on the north shore of the Persian Gulf were probably the world's first sea-traders.

GERMAN WOMEN HANDLING MAIL

Many of the parcels-post and express packages in European countries are handled by women. In world trade the parcels-post system plays an enormous part. Millions of pounds of food, clothing, and manufactured goods are sent by this service every year.

A MAIL DELIVERY IN SWITZERLAND

"COAL IS LIFE" AND THE GREATEST OF ALL CARGOES

Germany, under the terms of the Versailles Treaty, must deliver millions of tons of coal each year to the Allies. Because of labor shortage, women are used on much surface work.

THE PORT OF DANZIG, NOW A NEW FREE CITY, POLAND'S "WINDOW TO THE BALTIC"

"EVERY TIME AN AMERICAN KIDDIE WRECKS AN IMPORTED TOY IT MEANS MORE TRADE FOR THE TOY-MAKERS OF NUREMBERG"

This picture is not an interior view of a taxidermist's shop nor a miniature Noah's ark; it is simply a toy shop in full blast.

DECORATING CHINAWARE BY HAND

Every time a waiter in Denver drops a plate it means business for a potter in Dresden, or did before the war. For years our big hotels depended largely on the pottery-makers of Saxony. In recent years, however, what from war, fuel shortage, strikes, and other troubles, the exports of chinaware and glass from Germany to the United States have been very small.

HOPS FOR HOME BREWERS

For generations a great annual hop market has been held at Nuremberg. Every autumn buyers from breweries all over Europe swarm to this old town, where giant bags of hops for sale are piled in the streets.

how much, the white or black or brown races in far-away lands are producing above their own needs, and they know in what language to write to them, and what steamer line or connecting railway offers quickest, cheapest freight haul.

Figuratively, these men know whether Fiji or Formosa wants furniture or fountain pens, calico or corned beef, pink pills or canned peaches, baby-grands or baby buggies. They know, for example, much more of France than was contained in that classic paragraph of your old school geography which, after naming the cities and rivers, generously added: "The inhabitants are a gay and frivolous race, addicted to light wines and dancing"!

A KNOWLEDGE OF GEOGRAPHY VITAL TO THE INTERNATIONAL INVESTOR

Trade has been called the "economic fruit of geographic environment"; and whether a bold Yankee firm pioneering for trade will invest the first million in a foreign land depends almost slavishly on geographic considerations.

A well-known banker has vigorously asserted that commercial geography is the most important part of an international banker's education; that is, before he opens a branch in Cairo or Calcutta or urges a merchant to seek trade there, he must know the local situation not only as to money, politics, and native characteristics, but also as to climate, rainfall, crops, and communications.

Prof. J. Russell Smith says: "That the trader should know the people with whom he trades is a truism. . . . We must give them what they want. I recall in this connection a ludicrous old story concerning the clock trade in Africa.

"The English had been supplying a great number of cheap alarm clocks to a jungle tribe. Suddenly the trade ceased. Investigation showed the entire clock trade had been taken over by a German firm, which had, after looking into it, found out what kind of a clock the African really wanted.

"The native had no knowledge of time; he merely liked to look at the shiny nickel thing in his grass hut, and to hear it tick. With this cue, the German had hurried

INLAND WATER TRANSPORT IS ONE OF GERMANY'S GREATEST ASSETS

Some of the canal-boats are still poled or pulled by men, though many are equipped with engines.

PUTTING A BOVINE PASSENGER ASHORE

More than 20,000 steamers, barges, and tugs—over 5,000,000 tons of shipping in all—ply the Rhine. Here is an example for America in the use of inland rivers.

home. If it was the 'tick' the African wanted, he would supply it. So out came a kind of clock that sounded like a boy with a tack-hammer. Delight ran through the leafy woods of Africa, and the German clock went like wildfire!"

HOW OVERSEAS TRADE DEVELOPED

A hasty sketch of the high points in the history of world trade proves how much our map and its peculiarities have influenced all buying and selling.

It was the geographic pioneering of bold Latin sea-rovers in the fifteenth century that gave Europe its first adventure in ocean commerce. Up to that time, trade between nations had been carried on by caravans or mere coast boats. Even to this day it is possible to trace some of the old overland "silk routes" from China to Syria, to Poland, and to the Rhine; they always began in one great political center and ended in another.

In those days, too, sea-traders with cargoes from the Levant began to feel their way across the Mediterranean, while Chinese junks even ventured around to India and up the Tigris. Incidentally, it was this timid venturing along coast routes that maintained the commercial supremacy of Italy from Roman times till the Renaissance, Italy's bootlike peninsula making of her a great mole or pier extending down into the Mediterranean.

Because of the warlike Turks and their depredations on the caravans that followed the overland trail of Marco Polo, Europe became more and more anxious for a sea route to the legendary riches of India. And finally, thanks to doughty old Vasco da Gama, one of the boldest geographers of his day, the staunch windjammers of Lisbon reached the west coast of India. Six years previously, the greatest of Italian navigators had put to sea flying the flag of Spain and found a New World.

Thus these daring sailors not only put new continents on the map, to the consternation of the geographers of that day, but they brought on the greatest political and economic crisis that the world had ever known.

For two centuries Europe was shaken as a result of these voyages, and the centers of power shifted from the Mediterranean to the Atlantic coast—that is, from Venice and Genoa to Spain and Portugal; then to France, to Holland, and finally to England.

When bigger ships came into use, and when the importation of gold, diamonds, slaves, silks, and spices was followed by the import of more bulky raw materials, which were in turn exported in the form of manufactured goods, England crowded ahead. Her splendid geographical position, her harbors, her coal and iron mines, enabled her to gain the mastery of the seas.

WHEN AMERICA TOOK ITS PLACE AMONG SEA POWERS

Tracing the mastery of the seas down through the centuries, from the days of the supremacy of Tyre, nation by nation, until England assumed the leadership, William Brown Meloney, in "The Heritage of Tyre," says:

"In England's hands the Phœnician trident became a magic wand. A handful of islands burgeoned into such an empire as Rome might have been had she worn her sword more in its sheath. Britain became Great Britain, London a second Tyre, and Bristol another Venice. Yet in a moment when Britain was never so powerful, never so great, a new people—a people whom the family of nations barely deigned to notice—claimed coheirship. In the eyes of an astounded world the United States established her birthright in the freedom of the seas as no other heir of Tyre had ever done."

What heart does not thrill at the memory of those proud days of the *Flying Cloud*, the *Belle of the Sea*, or the *Red Rover*, when America carried 92 per cent of all her overseas trade in her own bottoms! When our "cod-headed, mackerel-tailed" clippers could make the Calcutta run in 95 days; when the famous *James Baine* logged 21 knots with mainskysail set and made a world record!

The story of the misfortunes of the sixties and the decline of our merchant marine is familiar. Even when Roosevelt sent The Fleet around the world, we had to depend on foreign colliers.

OUR MERCHANT MARINE RETURNS

But today, from Memel to Melbourne, our merchant ships—stupendous heritage

© Chas. Trampus

AN INCIDENT OF SEA TRADE: A HAMBURG TUG THAT "WENT ON THE BEACH" AT HIGH TIDE AND REMAINED THERE

of the World War—are poking their newly painted noses into every harbor of the world.

Look at a Shipping Board chart and see how our lines encircle the earth. With a trained, alert consul in every foreign port, his big freighters on every sea and a navy to protect them, Uncle Sam has indeed fully atoned for the misfortunes of the sixties; he has vindicated himself and recovered his rightful place among sea-traders.

But to hold this place he knows he must fight, fight boldly, skillfully, and doggedly, with all the deft weapons of commerce and diplomacy; for the war so upset world economics that he now finds himself in an unprecedented international position.

Other nations owe him more than ten billion dollars—three times his own national debt in 1914. A swiftly rising immigrant tide flows to America in a human stream from all the lands of Europe. Every week our factories turn out shiploads of goods above our own requirements, for which we must find markets abroad, in competition not only with our late allies but with other nations now struggling desperately for economic life.

THE STELLAR RÔLE OF THE AMERICAN CONSUL IN THE DRAMA OF TRADE

And now, as in that keenly competitive commercial era of the old Venetian traders, no actor plays a more interesting or adventurous rôle than the consul.

In this war-after-the-war, this big battle for world trade, our consuls are scouts and reporters in foreign lands. They keep us informed by mail and cable not only on every phase of our own foreign business, but on the activities of world competitors, so that we may shape our policies accordingly.

In the State Department at Washington there's a big map of the world bristling with colored pins, like a war map of the general staff. This map shows where our consuls are posted. There is a dense flock of pins covering Europe and Latin America and thin patches over Africa and Asia.

These pins indicate how enormously trade is ruled by the peculiarities of the map and the distribution of various races and industries.

Photograph by L. and A. Schaul

THE GHOST SHIP, A MARINE WORK OF ART

This collaboration of wind and waves and Jack Frost demonstrates what a voyage to northern seas in winter may mean.

A BLACK FOREST WOMAN SPINNING HER FLAX

Here, as in the Spreewald, the oldtime spinning-wheel is used.

Our merchant fleet in foreign waters is the special charge of these consuls. If an American ship "piles up" on the rocks, the nearest Yankee consul takes charge of the wreck and cares for the crew and passengers. Mutinies and tariff tangles, quarantine and emigrant trade troubles, are all aired before the consul, and the American seaman out of a berth in foreign parts is sure of aid at the Sign of the Eagle.

In fact, so heavy has the consul's task become, under the extra burdens imposed by our enlarged fleet and increasing trade, that the expansion and further improvement of our foreign service is imperative if we are to protect adequately our people and their interests overseas.

Many countries doubled their population in the last century.

In Berlin, where I write this, the theory prevails that overpopulation was the indirect cause of the war. Ratzel, a German writer, says that since population grows while the earth's habitable areas are fixed, the earth must be made to yield more in order to feed its increasing inhabitants; that thus land values rise, and states are led to fight for more territory and to seek foreign markets.

THE NOMAD YIELDS TO THE FARMER

Nations can no longer measure their greatness, as the Romans did, by counting the tribes they have conquered; today power is shown by the use a nation

WHERE THEY KEEP THE PIG IN THE PARLOR

The United States handles three-fourths of all the world's pork exports, and all over the world the proportion of pigs to people is decreasing. Among European peasants, as among the Chinese and Malays, no other animal is more highly prized or so carefully nurtured.

makes of its resources and the extent to which it buys and sells overseas.

The picturesque nomad of Arabia or Turkestan, though he contributes occasional wool and hides to the world's trade, is not really worth his space on the map, judged by modern economic standards. So, gradually, in Egypt, Mesopotamia, and western Siberia, irrigation, railways, and the stubborn tide of immigrant farmers are forcing the nomad to abandon his roving life and go to work or go the way of Lo, our poor Indian.

MIRACLES OF CHANGE WROUGHT IN THE NEAR EAST

In the Levant the geographical consequences of war have affected the trade of the world to a striking degree. Boundary lines have twisted, caliphs have gone down and kings come up. Over all is the shadow of the famous Bagdad Railway and the odor of oil.

Persia, fighting bankruptcy for 400 years, is suddenly galvanized into new life by the Anglo-Persian Oil Company's great works on the Karun.

A whole world watches the mandate experiments in Mesopotamia and Syria, speculates on the problems of Palestine and its Jewish home, and follows with interest the struggles of Armenia and Georgia toward democracy.

Old caravan trails, blazed long ago by Hittites, Medes, and Persians, are being abandoned as new governments, new borders, and new railways bring new channels of traffic and sweeping changes in the trade geography of this old Bible land.

Obscure, squalid, and once little-known ports are busy with new life. England is spending millions at the Palestine port of Haifa. Basra, old haunt of Sinbad the Sailor, becomes again, after ages of neglect, the great port of the Persian Gulf.

MARBLE FOR BAR-ROOMS, BATHS, AND TOMBSTONES

These blocks are being hauled from the famous quarries at Carrara. The Italian driver sits on the ox-yoke, riding backward, to get a more convenient crack at the lazy oxen. From this fine marble everything, from vases and Venuses to tubs and monuments, will be made.

MERRY CHRISTMAS!

Turkeys herded in the streets of Durazzo, Albania. These birds are driven across country to market, as cattle are driven in our country.

A STREET SCENE IN SMYRNA, WESTERN TERMINUS OF THE ANCIENT CARAVAN TRAILS FROM ASIA TO THE MEDITERRANEAN

Bagdad, asleep for a thousand years, now has telephones, "movies," "flivvers" and electric fans, new railways in three directions, and airplane flights to Mosul and Teheran. Yet when I lived there, ten short years ago, we were often shut off from civilization for weeks by Arab wars. Bedouins, carrying their spears, rode through the streets on camels, and at night a nervous Pasha closed the great gates of the walled city to shut out marauders from the desert.

WHAT AMERICA GIVES AND WHAT SHE RECEIVES

Look at our steamship lines as marked on a map and see how foods, clothing, machinery, manufactures, and raw materials flow up and down the world and around it, like the currents of air and water.

Our own trade routes run everywhere, but the heaviest lines go to Europe and the other Americas; then to Asia, Oceanica, and Africa.

More than half our imports are in crude or partly manufactured form; food makes up less than one-fourth.

With the break-up of the cattle ranges in our own West, we depend more and more on Mexico and South America for beef. But even these great cow countries cannot feed the whole hungry world indefinitely, and many cowmen say the day is coming when the vast grassy plains of Mongolia and eastern Russia, now so scantly utilized, will be the grazing grounds for additional millions of sheep, cattle, and goats, and that the Mongols, the Kirghiz, and the Turkomans may become the future cattle kings of the world, with packing plants from Urga to Samarkand.

From the hot lands come raw materials like Philippine hemp, Indian jute, Mexican sisal, Brazilian and African rubber. From South America and Asia we get hides, skins, and bristles, while wool comes from Argentina and Europe.

Our trade current from the tropics has grown vastly in recent years; so has our exchange of goods with Asia and the East Indies, where we trade machinery, drugs, flour, and manufactures for silk, fibers, hides, coffee, tea, and rice.

Borne by these same currents, the Yan-

A THRESHING-MACHINE IN RUMANIA

Horse and cow power, with a girl to drive. Here, too, an important market awaits the American salesman of harvesting-machines.

A PUBLIC HORSE MARKET IN LOWER HUNGARY

In America our old-fashioned "county fairs" are dying out. In Europe, however, the fair is still an important trade factor. The annual fairs at Leipzig and Danzig are visited by buyers from all over the world. The last Leipzig fair was attended by 12,000 buyers, representing 26 countries.

IN THE POPULAR MIND, HUNGARY IS THE HOME OF RHAPSODIES—AND GOULASH

It is also a wonderful storehouse of foods, in normal times. Its thrifty folk grow and export fruits, vegetables, grains, and meats.

kee type of culture is carried to all quarters of the globe.

Riding a mule along the Chinese wall, I once came suddenly on a battered tin sign which some wag had nailed to that old Tatar barrier. It spoke of a town far back in America, a pleasant place by Lake Michigan famous long ago for a fluid our fathers fancied. Even the ubiquitous Yankee trade-mark breathes a geographic psychology all its own. From the mud walls of Bombay to the billboards of Brussels, our familiar advertising words and pictures, advance agents of foreign trade, cry a rude Yankee welcome to the wandering American.

Get off your steamer at any busy overseas port and these American signs boldly greet you, inviting you to eat something "Made in the U. S. A.," or drink it, or rub it in your hair. Esthetic souls may shudder, but to me there is something friendly, neighborly, in these familiar signs and phrases; they hint at old times and places, they suggest *home*.

Our consuls say the theft of these Yankee trade-marks is a piracy carried to amazing lengths. The official bulletin of a certain government recently showed that in one month a local pirate had registered 50 American trade-marks, for the evident purpose of exacting blackmail from the rightful owners when ready to enter that field.

RIVERS AS TRADE FEEDERS

In world trade, coast cities grow greatest when built on harbors that connect by rail or river with inland regions of dense population and large production.

The sea made New York great and brought wealth to Baltimore and New Orleans. Hamburg, as a trade-feeder, serves inland Europe as far south as Vienna and Prague. Rotterdam, "the city of herrings," waxes fat on the Rhine.

From the wonderful development of this same Rhine we Americans, staggering under high freights and congested railways, can learn a great lesson on "How to use rivers."

Navigable for 500 miles, the Rhine boasts more than 20,000 steamers, tugs, and barges—over 5,000,000 tons of shipping all crowded upon one swift, shallow stream. Competing railways cross it and run up and down both its winding, busy banks. Yet these flat-bottom Rhine sidewheelers are busy the year round, towing their long trains of laden barges from Rotterdam to Cologne, to Coblenz, Mainz, Mannheim, and even into Switzerland, as

THE SOURCE OF CAVIAR

The picture shows Russians taking the fish eggs for making this famous delicacy.

DOUGHNUTS, NOT HORSESHOES!

Every article, from toy balloons to kosher doughnuts and "fish-jam" (caviar), is seen in the Moscow bazaar. In every European capital today merchants and diplomats are eagerly bent on working out some plan to start trade with Russia just as soon as political conditions will permit. Germany, especially, confidently hopes to trade overland with Russia and Asia, thus getting food, wool, oil, and cotton and making up for the loss of her merchant marine.

KIRGHIZ NOMAD CHILDREN

Many European economists say that when the world quiets down again a great tide of emigration will probably flow from central and western Europe to the vast pastoral regions of southern Russia and Transcaucasia. Here, in this middle of the world, it is predicted a great cattle and sheep industry will one day develop, and that this region, coupled with Siberia and Mongolia, may become man's chief source of supply of meat-producing animals.

well as feeding the network of canals that ties into this great waterway.

If we could get steamboat trade started again on the Missouri, for example, as in those glad, wild days when troop-carrying, Sioux-fighting stern-wheelers beat up the Big Muddy as far as old Fort Benton, think of the benefit accruing to the Kansas City grain exporter—a cheap, all-water haul, merely one reloading from the river barge at New Orleans to the ocean-going freighter.

Such a combined river-sea freight service, with through rates from Rhine cities to oversea ports, was maintained by the Germans before the war. No wonder the Mannheim manufacturer could sell cheaply in Bombay or Buenos Aires. This same inland waterway transport made it cheaper for Berlin to import hard coal from overseas than to burn native coal *shipped by rail* from southeast Germany, a few hours distant.

No country affords a more striking example of the value of inland waterways in building up foreign trade than does Germany. One of the greatest sources of her economic strength was her incomparable system of navigable rivers and canals, her improved ports and harbors, and her amazingly efficient cranes, derricks, and other mechanical aids for loading and unloading ships.

THE RÔLE PLAYED BY THE BOUNDARY LINE

Man-made laws, as well as winds and tides, have their effect on shipping. Sugar, tobacco, and hemp, pearls, perfumery, and coconuts move freely from Manila to America because we enjoy mutual free trade. Toronto trades easily with Trinidad, but the firm in Providence that makes rifles cannot ship to Mexico when an embargo happens to be on; nor can a dye-maker in Mannheim sell his colors to a Shanghai weaver without a government permit. Today you cannot take a souvenir tea-cup out of Germany without an *erlaubnis* any more than you can ship

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DOCK WORKERS, WITH THEIR PECULIAR WHEELBARROWS, AT SHANGHAI

When the truck follows the wheelbarrow in China (as roads are built) and trade with the hinterland grows, we shall come to depend more and more on China for various raw materials. It is freely predicted that China is now on the verge of what may be the greatest economic growth that any nation has ever known. Even in the past 30 years her foreign trade has increased 500 per cent.

a gill of gin from Jamaica to Baltimore and hold your pew.

And what a rôle the red lines called boundaries play in commercial geography! What a startling cross-section of human life, civilization, manners, morals, and customs these dividing lines between nations often show!

Flora, fauna, and climate of neighboring countries may be identical, but the people, in race, religion and speech, morals and manners, how different! Yet their very needs, arising from their different standards and tastes, their resources and products, lend impulse to barter and sale, lead one tribe to trade with the other, and so add to the complex commercial geography of civilization.

In midwinter our Denver cafés serve ripe tomatoes from the Mexican west coast; and the señoritas of Mazatlan, ordering their trousseaus by mail from California modistes, look on Los Angeles as the center of the world's wealth, culture, and fashion—amusing, perhaps, to New York or Paris, but only an accident of trade geography.

Since the days of wampum, the unit of exchange has been a big factor in the world's trade. Even money has a geography. The answer to the question, How rich are you? depends on where you are when you count your cash. Lately the gymnastics of the mark have turned German trade efforts back to the middle-age habits of barter; the Germans, ask-

ing for raw cotton, offered to pay in socks and underwear made from that cotton.

Geographically, England's position as a distributing center is unique. Goods gathered there from the Seven Seas are easily reshipped to other nations on the Atlantic, the Baltic, or the North Sea. Though she has no rich "back country," few inland waterways, and not factories enough to keep all her ships busy, yet she is great and strong as a trader because she draws on so many oversea colonies.

Norway, on the other hand, being without colonies, but rich in ships and good harbors, charters her boats to others or sends them out as tramps to haul what they can find.

Holland, though producing little and though only a speck on the map, occupies an enviable place in the foreign trade of Europe, lying, as she does, in the heart of the world's commercial center. As traders, the Dutch are without peers. They have actually bought from us, and then undersold us in what we are pleased to call our own markets.

SAWING WOOD IN CHINA

The coolie's pay is so small that he is never more than one day ahead of an empty stomach.

HOW TRADE FOLLOWS THE FLAG

Intense propaganda, not always complimentary to the rival, marks the fight of nations for ocean trade. To see that America is not sinned against is one of our consuls' obligations.

Periodicals, lectures, fairs, motion pictures, and personal visits are all used to make sales, to say nothing of deals and secret compacts among governments.

To push its trade in the South Seas, Japan has set up a commercial museum in Singapore, and is opening a similar exhibit at Harbin for educational work in Manchuria, Mongolia, and Siberia.

From that day in '98 when the influence of the United States was first felt in the Philippines, the brown men there began to flourish. It was the first chance civilization had given them. Today even the most chronic critics of our colonial policy admit that the uplift of Manila, largely due to its close commercial relations with America, is a splendid demonstration of how to carry the white man's burden.

Hawaii has increased its producing

power perhaps fortyfold since "the days of the Empire."

Porto Rico, basking in new-gained opulence, easily imports oversea luxuries and pays with native fruits at fancy prices, because we gave her ships and honest rule.

It is so in Guam; it will be so in the Virgins.

And, since each year we buy more and more from the tropics, it follows that eventually our possessions in the zone of coconuts and crocodiles will, with the aid of Yankee energy, capital, and coöperation, supply us with more and more hemp, jute, sugar, fruits, coffee, and tobacco, and maybe even silk, tea, and rubber, for which we now pay fabulous sums each year to foreigners.

This prestige of the flag, backed by favorable treaties and a vigorous administration, working through trained consuls capable of protecting our interests overseas, imparts courage and enthusiasm to traders and bankers and builds up trade.

Today, for the first time since Yankee whalers split the foam and cobalt from Ensenada to the Aleutians, Pacific paths are once more crowded with American ships, and our own trade with the East increased 300 per cent in the last five years.

To study this culture, the life, language, and habits of oversea races, and to keep America posted on their needs and products is one of the consul's chief functions.

Man's chief needs can be named on the fingers of one hand—food, clothes, heat, light—and of all these we are the world's greatest producer.

It is the very vastness of our own industries and the immensity of our agriculture which cause many Americans to overlook the fact that each year, as we grow, we must import more and more, to balance industry.

Latin America is our greatest storehouse. From her we draw hides, asphalt, tobacco, rubber, sisal, and fruits, as well as oil, silver, copper, zinc, wolfram, vanadium, and iron ore.

Without Cuba we should be quite sugarless and unhappy, and what an epidemic of headaches from Maine to California if Brazil were to refuse that 98 per cent of all our coffee which now comes from her shores.

Perhaps some of the factories in your own home town would have to shut down were we to be suddenly cut off from the stream of raw materials that flows to us from the China Sea.

A mere fragment this, in the great story of trade. But what a vivid, smashing world drama it is, this age-long battle of puny man, this magnificent struggle on land and sea, to live!

The pirates and buccaneers, the China clippers and the bold Bedford whalers are gone forever, but the romance of trade and geography is not dead. Nor does it live only in the fiction of Conrad. It lurks even in restaurant menu cards.

Stop and reflect the next time you order a dinner, from caviar to nuts. Think of the strife, the peril and adventure, of all those who fight in forest and jungle, on pampas and steppes, or go down to the sea in ships in order to feed and clothe the world.

How amazingly complex is foreign trade, and yet how comfortable it makes us. What a debt we owe to that restless, imaginative man who first braved the unknown and brought back the new fruits and the strange slave girls—the pioneer of barter on the sea.

A "COUNTRIES OF THE CARIBBEAN" MAP IN FEBRUARY

CONTINUING its comprehensive map program of 1921, when large scale maps of the New Europe, of Asia, of South America, and of the Islands of the Pacific were issued as supplements to its Magazine, the National Geographic Society has compiled a handsome map in colors of the Countries of the Caribbean which will appear with the February number. This map, size 44 x 25 inches, will show in detail Mexico, the new Republic of Central America (including Guatemala, Honduras, and Salvador), Costa Rica, Panama, and the Islands of the West Indies, together with large scale insert maps of Guantanamo Bay, Porto Rico and the Virgin Islands, and the Panama Canal Zone. Maps of Africa and of the World will be issued as supplements in subsequent numbers of the Magazine.

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THE FOREMOST INTELLECTUAL ACHIEVEMENT OF ANCIENT AMERICA

The Hieroglyphic Inscriptions on the Monuments in the Ruined Cities of Mexico, Guatemala, and Honduras Are Yielding the Secrets of the Maya Civilization

BY SYLVANUS GRISWOLD MORLEY

CARNEGIE INSTITUTION OF WASHINGTON, AUTHOR OF "THE EXCAVATIONS AT QUIRIGUA, GUATEMALA," IN THE NATIONAL GEOGRAPHIC MAGAZINE

DURING the first millennium before Christ, while yet our own forebears of northern Europe were plunged in the depths of barbarism, there developed somewhere in Middle America, probably on the Gulf Coast of southern Mexico, a great aboriginal civilization called the Maya, which was destined to become the most brilliant expression of the ancient American mind.

Somewhat later, probably about the beginning of the Christian era, the Maya seem to have found their way into what is now the northern part of Guatemala, the Department of Peten, and the States of Chiapas and Tabasco, Mexico, and here for the next 600 years they flourished most amazingly. (See the supplementary map of "The Countries of the Caribbean.")

During these centuries this highly gifted people, not inaptly called "the Greeks of the New World," were slowly fighting upward from savagery through barbarism to the threshold of civilization.

Their priests and astronomers were gathering from the stars the secrets of time and its accurate measure, the revolutions of the sun, moon, and planets; their mathematicians and chronologists were devising a calendar and chronology which was without peer on this continent and excelled by none in the Old World at that time; their builders were developing an architecture at once unique, dignified, and beautiful; their sculptors were carving the most elaborate compositions and designs in stone; their leaders had mastered the problems of social and governmental organization and were administering the state adequately and well. In short, a great national life was quickening to its fullest expression.

The zenith of their civilization, however—indeed, the intellectual climax of all civilizations—was the development of a hieroglyphic writing which, moreover, was the only system of writing in the New World worthy of comparison with the earlier graphic systems of the Old World, such as those of Egypt, of Babylonia, and of China, for example.

MAYA WRITINGS TRANSFERRED TO STONE BEFORE THE BIRTH OF CHRIST

This hieroglyphic writing was doubtless first developed upon wood, fiber-paper or skins, but shortly before the be-

THE BALL COURT AT CHICHEN ITZA, YUCATAN

In this immense court, large as a foot-ball field, a game of ball was played called "tlachtli," not unlike our modern game of basket-ball. The player who succeeded in driving the ball through the ring attached to the center of each wall (that on the right is still in its original position) had forfeited to him by ancient custom of the game all the clothing and jewelry of the spectators.

ginning of the Christian era it was transferred to stone, inscribed upon monuments and altars, which were erected in the courts and plazas in front of the principal temples of the different Maya cities.

And here, buried in the vast tropical forests of northern Central America, and especially in the State of Guatemala, these splendid memorials of a forgotten people are slowly coming to light.

Year after year archæological expeditions sent out by American scientific institutions are penetrating deeper and deeper into these virgin fastnesses and are discovering new ruined cities, from the monuments and hieroglyphic inscriptions of which we are gradually reconstructing the outlines of ancient Maya history.

The only other business which brings man into these tropical forests of northern Guatemala is one of our most important American industries, what might be termed, perhaps, our national sport—chewing gum.

The principal ingredient of chewing gum is "chicle," which is obtained from a tree called the "chico-sapote," growing in these forests. Indeed, the archæologist is deeply indebted to the chicle business for bringing him first news of new cities found in the bush from time to time by the chicle-hunters.

The writer has a standing reward offered to all *chicleros* for "information leading to the capture, dead or alive," of any new group of ruins where there are hieroglyphic monuments, and already this expedient has resulted in the discovery of several important cities.

It is the chicle-operators who keep the trails open; who locate the water-holes for camping-places; who maintain mule-trains, the only means of transportation possible in the region; whose activities bring labor into the bush. In short, in this field, at least, the archæologist could scarcely pursue his profession were it not for our popular pastime of chewing gum. But to return to our subject.

MAYA WRITING REPRESENTS TURNING POINT IN HUMAN HISTORY

The peculiar importance of the Maya hieroglyphic writing lies in the fact that it represents a stage in the science of

Courtesy of The Carnegie Institution of Washington

A CHICLE (CHEWING-GUM) CAMP IN A CLEARING IN THE FORESTS OF PETEN, GUATEMALA

These camps are located near aguadas, or water-holes, and are sometimes of a fairly permanent nature. The houses have palm-leaf thatched roofs and sides of boughs, and are thoroughly water-proof. A pile of chicle bales is seen in the foreground, each weighing from 100 to 150 pounds and being about the size of a large block of ice. The Carnegie Expedition's mule-train has just arrived at this camp; two mules are being unloaded at the left of the picture, and the table and cots are already set up for the night. Retiring in these forests is no light task, involving, as it does, the arrangement of an elaborate mosquito-netting and a search for stray insects with an electric torch before the process is complete.

Courtesy of The Carnegie Institution of Washington

AT THE RUINS OF IXLU, IN NORTHERN PETEN, GUATEMALA

The ruins of Ixlu were discovered on April 10, 1921. This photograph shows His Excellency Dr. José Prado Romaña, Governor of Peten; Mr. M. D. Bromberg, vice-president of the American Chicle Company, and several members of the Carnegie Central American Expedition staff on a visit of inspection to the newly discovered site, standing near one of the stone altars (see illustration on opposite page).

expressing thoughts by graphic symbols not exemplified by the writing of any other people, ancient or modern. It stands at that momentous point in the development of the human race where graphic symbols representing sounds were just beginning to replace symbols representing ideas.

Man's first efforts at writing were doubtless as highly realistic as he could make them with his clumsy hands and still clumsier tools and drawing materials. If he wanted to express the idea "horse," he was obliged to draw the picture of a horse, since he had no symbols or characters by means of which the sound of its name could be indicated. In short, he was obliged to convey the idea of a horse to the brain by means of the eye and not the ear—realistically—that is, by its picture—instead of phonetically, by its sound.

This earliest method of expressing thoughts graphically has been called ideographic writing because its symbols express ideas instead of sounds, as do the characters of our own alphabet.

It is obvious that this kind of writing has a very limited range, being able to express little more than concrete objects, and scarcely at all to convey action, save only by the clumsy makeshift of pictures representing specific acts; and man in the course of his development eventually devised a better method of expressing his thoughts than by merely drawing pictures of them.

BIRTH OF THE ALPHABET'S FIRST ANCESTOR

At this point we reach, for the first time, the introduction of the phonetic element into writing—that is to say, where a sign or character came to represent a sound, a syllable, or a letter and ceased to be a picture of an idea. And it is precisely at this important turning point in the history of writing that the

Courtesy of The Carnegie Institution of Washington

THE ALTAR OF STELA 2, AT THE RUINS OF IXLU, PETEN, GUATEMALA

This beautiful example of Maya stone-carving, when first seen by Dr. Morley, on April 10, 1921, was tightly clasped in the roots of a large breadnut tree which was growing on top of it. When this tree was felled the next day and the altar beneath turned face upward for the first time in more than a thousand years, it was found to have six columns of hieroglyphs sculptured on its top in an almost perfect state of preservation, or 32 in all. It has been possible to decipher only the first five of these, namely, the first and second signs in the first column and the first, second, and third in the second column. These five, however, record the date of this altar as having been 10.2.10.0.0 2 Ahau 13 Chen of the Maya era (620 A. D.).

Maya graphic system stands, representing, as stated previously, a stage in the development of writing found nowhere else in the world.

This change in the character of writing symbols, from signs representing ideas to signs representing sounds, was fundamental, and its far-reaching effects cannot be overstated. It soon made possible an enormous expansion in the subjects which could be expressed by writing, and it ultimately enabled mankind to write about everything he could talk or even think about; in short, it reduced his universe to black and white—the written word.

Any graphic system, therefore, which stands at this crucial point in the evolution of writing is worthy of closer study and cannot be devoid of general interest, and in the following pages the writer has endeavored to present to the readers of the NATIONAL GEOGRAPHIC MAGAZINE a brief description of its principal characteristics.

AZTEC WRITING SIMPLER THAN THAT OF THE MAYA

However, before describing the Maya hieroglyphic writing, it will, perhaps, be easier to begin by describing the writing of the Aztec, the dominant Indian tribe of the Valley of Mexico, who had attained a high degree of civilization long before their conquest and practical annihilation by the Spaniards under Cortez, in 1521.

The Maya hieroglyphic writing was much older than that of the Aztec, and

Courtesy of the School of American Research

THE CENOTE, OR GREAT POOL OF SACRIFICE, AT CHICHEN ITZA, YUCATAN

The ceremonies begun on the lofty summit of the Castillo (see page 164) had their ending at the brink of this great natural pool or well. The spot is solemn and awe-inspiring. A great hole in the earth, 225 feet in diameter, with perpendicular or undercut sides, dropping 70 feet to the level of the black, mysterious water below, is fringed on all sides by the dense tropical forest. Here the Maya, in times of drought, formerly brought their most beautiful maidens, and from a little platform near the small shrine at the left of the picture hurled them into the depths below. If any survived the tremendous shock of this great drop and struggled to the surface of the water, ropes were let down to them and they were hauled out, more dead than alive, we may well believe. Once again on *terra firma*, they were questioned by the priests as to what they had seen below? What the gods had in store for mankind? Would the following year bring forth rain and plenty or drought and famine? For these girls were believed to have found out the answers to these questions from the rain deities at the bottom of this pool.

from the former the Aztec doubtless originally borrowed the idea of writing.

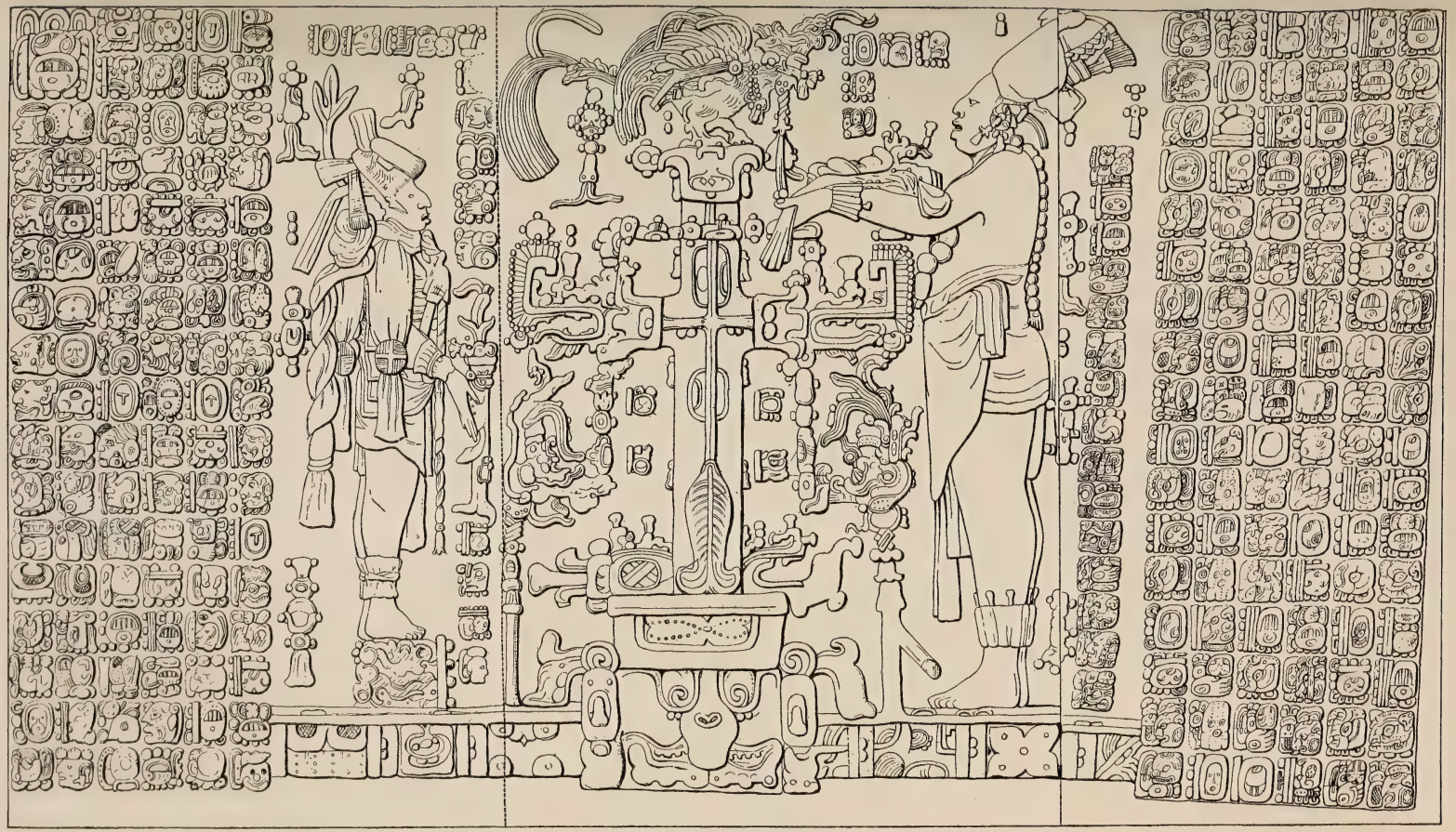
The Aztec writing is simpler than the Maya, and is better known, probably as high as 90 per cent of its signs and symbols having been deciphered. Their hieroglyphs may be divided into three groups, as follows:

1. Signs representing the calendar, such as the hieroglyphs for the days, months, and the year;

2. Signs representing the names of persons and places, such as the hieroglyphs for Montezuma and Tenochtitlan (the Aztec name for Mexico City);

3. Signs representing events or natural objects, such as the hieroglyphs for war, conquest, death, accession of rulers, festivals, eclipses, comets, earthquakes, volcanic eruptions, gold, jade, feathers, etc.

By means of these three groups of signs, painted in books made of fiber-paper or deerskin, the Aztec recorded the principal events of their history, not, to be sure, as long narratives glowing with eulogistic descriptions of the valorous deeds of kings and emperors, but as brief synopses of the principal events, none the less historically accurate, however, because of their brevity.



THE TABLET FROM THE TEMPLE OF THE CROSS AT PALENQUÉ, MEXICO

This magnificent specimen of ancient Maya art is engraved upon three slabs of cream-colored limestone, which originally rested against the back wall of the sanctuary in the Temple of the Cross at Palenque, Chiapas, Mexico. In 1840 the American diplomat and traveler, John Lloyd Stephens, had the left-hand panel removed to the United States, where for more than half a century it remained in the Smithsonian Institution. Many years later the right-hand panel was removed to the National Museum in Mexico City, and still later the central panel, upon which the representation of a cross flanked by two officiating priests is carved, was also taken to the same place.

After the visit of former Secretary of State Root to Mexico, the panel in the Smithsonian Institution was returned to the Government of Mexico, a graceful act of international courtesy; so that now, after the lapse of nearly three-quarters of a century, the three panels of this beautiful aboriginal sculpture are again reunited in the National Museum in Mexico City.

EXAMPLE OF REBUS-WRITING: THE AZTEC HIEROGLYPHS FOR PERSONAL AND PLACE NAMES WERE CONSTRUCTED ON THIS BASIS

The phonetic principle upon which rebus-writing is based is that of homophones—*i. e.*, words which sound alike or similar, but which have different meanings. The above rebus should be read: "I believe Aunt Rose can well bear all for you."

The Aztec calendar consisted of a year of 18 months of 20 days each, and a closing period of five days, into which it was believed all the bad luck of the year was crowded. No one started upon a journey during these five days, for fear some misfortune would befall him; no woodcutter ventured into the forest to hew wood during this period, lest wild beasts should devour him; the houses were left unswept; the housewives made no pottery vessels; children so unfortunate as to be born on one of these five days were by that very fact predestined to misfortune for the rest of their lives; it was, in fact, the "Friday the 13th" of their year.

The next, and among the Aztec the only time period higher than the year, was the *xihuitlmolpia,* or cycle of 52 years. And if they believed the closing five days of the year were fraught with ill luck, they regarded the closing night of their 52-year period with far greater terror, since it was held that at the close of one of these periods would some day come the destruction of the world.

AZTEC HIEROGLYPHS RESEMBLED REBUS-WRITING

On the last night of the xihuitlmolpia fires were extinguished on the hearths and the inhabitants of Tenochtitlan moved out of the city and took up positions on the surrounding hills, waiting feverishly either for the destruction of the world or, in the event of sunrise, the dawn of another xihuitlmolpia. Once the sun had arisen, however, great were the rejoicings. Fires were rekindled and the crisis was over for another 52 years.

The hieroglyphs for the names of persons and places, the second group mentioned previously, were built up on the basis of our own old-fashioned rebus-writing, an example of which is given on this page. This depends upon the fact that many words of different meaning have the same or similar sounds, such as: to, too, two, bear, bare, reed, read, etc. In the rebus given above the pictures actually represent: an eye, a bee, a leaf, an ant, a rose, a can, a well, a bear, an awl, the number 4, and a ewe; but they may be transcribed as: "I believe Aunt Rose can well bear all for you." It was in this manner that the hieroglyphs for Aztec personal and place names were constructed.

HOW THE AZTEC RECORDED HISTORICAL EVENTS: THE ACCESSION OF MONTEZUMA

Finally, the third group of signs represented events and natural objects, such as death, war, conquest, accession of rulers, natural phenomena, gold, jade, etc. Thus a mummy-like human figure wrapped in cloths and tied with ropes represented death. A shield with javelins crossed behind it stood for war; a burning temple for conquest, etc.

The signs of this last group were the most limited in number, but they were at the same time of the most importance, since they alone gave point and life, as it were, to the characters of the other two groups.

HISTORICAL EVENTS REPRESENTED IN THE AZTEC HIEROGLYPHIC MANUSCRIPTS

The drawing on the left shows the death of the Aztec ruler, Ahuitzotl, in the year 10 Rabbit (1502 A. D.) and the accession of his nephew, Montezuma II. The mummy of a human figure bound with ropes, with a crown on its head, indicates the death of a ruler, a mummy being the Aztec hieroglyph for death. The little water-animal attached to the crown by a cord shows that the dead ruler's name was Ahuitzotl, that being the Aztec word for "water-animal." The right half of this drawing shows a man seated upon a dais, with a crown upon his head and a speech-scroll issuing from his mouth. The Aztec word for ruler was "tlahtouani," "he who speaks," shown graphically by the speech-scroll. Finally both figures are attached by cords to the circle above, which represents the year 10 Rabbit (1502 A. D.), indicating the date of this event.

The drawings at the center and right represent the conquest of Tehuantepec in the same year by Ahuitzotl shortly before his death. The year 10 Rabbit appears at the left, next the ruler Ahuitzotl, with the three emblems of Aztec royalty: the crown, the speech-scroll, and the dais with his name-hieroglyph, "Water-animal," above him. To the right and above is a shield with javelins crossed behind it, the hieroglyph for war; below the shield is a temple in flames, the hieroglyph for conquest. To the left of the temple is the hieroglyph for Tehuantepec, the head of a cat (tecuani) and a hill (tepec). The whole record might be paraphrased thus: In the year 10 Rabbit the ruler Ahuitzotl fought and conquered the town of Tehuantepec.

Several examples of the Aztec hieroglyphic writing are given on pages 117, 118, and 119. The picture at the left on this page represents the death of the Aztec ruler Ahuitzotl in 1502 A. D. and the accession of his nephew, Montezuma II, to the rulership of the tribe. At the top we see a circle, within which are a rabbit's head and 10 dots. This stands for the year 10 Tochtli or 10 Rabbit, corresponding to the year 1502 of the Christian era.

The Aztec had four different kinds of years: Reed, Flint, House, and Rabbit, named after the days (Reed, Flint, House, and Rabbit) with which they successively began. The numbers attached to these names, 1 to 13 inclusive, do not follow the sequence of our own numbers, so that the year 1 Flint follows the year 13 Reed.

Attached to the year 10 Rabbit, on the left, by a cord, there is the figure of a mummy bound with ropes and surmounted by a crown. This indicates the death of some ruler.

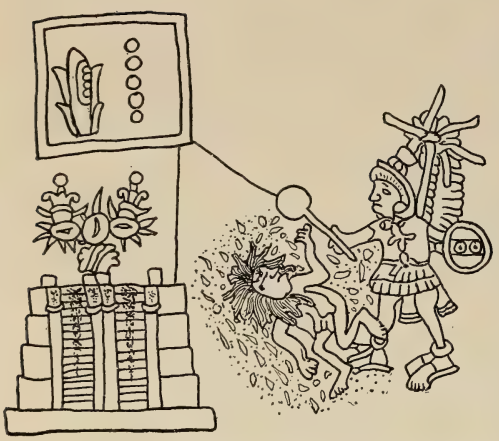
Another cord runs from the crown of this mummy to a small animal, from whose feet hang water symbols. This is the hieroglyph for Ahuitzotl, the Aztec word for water-animal. This much of our picture, then, records the death of the ruler Ahuitzotl in the year 10 Rabbit—*i. e.*, 1502 A. D.

To the right of this mummy there is a living figure, also attached to the circle above by a cord and also wearing the same crown. This right-hand figure is seated upon a dais, another emblem of Aztec royalty, and from its mouth there issues a scroll, the Aztec sign for supreme authority. The Aztec word for ruler was "tlahtouani," which means "he who speaks," shown graphically by a speech-scroll issuing from the mouth.

Finally, attached to the crown of the second figure is another crown, which is the hieroglyph for the name Montezuma, and the right-hand part of the picture is to be read: Montezuma became ruler in 1502.

THE RECORD OF A CONQUEST

Elliptical and abbreviated as this record is, it sets forth clearly that the ruler Ahuitzotl died in 1502 and was succeeded by Montezuma.



DEDICATION OF THE GREAT TEMPLE OF HUITZILIPOCHTLI, THE AZTEC GOD OF WAR, AT TENOCHTITLAN, IN THE YEAR 5 FLINT (1484 A. D.)

The year 5 Flint is represented in the square above by the flint with the five dots on its right. Below is the great temple of the War God, its stairway red with the blood of the sacrificial victims. On top of the pyramid is the hieroglyph for Tenochtitlan, the ancient name of Mexico City, expressed by a stone with a cactus growing out of it. On the right is a priest in the act of despatching one of the human victims. This event took place in the second year of the reign of Tizoc, the seventh Aztec ruler, and it is said to have been the first occasion when human sacrifice was practiced by the Aztec, previously to this the sacrifices having been of animals and birds.

The second and third figures on page 117 represent the conquest of the town of Tehuantepec by the Aztec ruler Ahuitzotl shortly before his death, in 1502. In the square at the left hand is the year 10 Rabbit, which corresponded, as explained previously, to the year 1502. Next Ahuitzotl is portrayed with the three emblems of Aztec royalty—the crown, the dais, and the speech-scroll. His name glyph, "The Water-animal," appears above, attached to his head by a cord.

The shield with the javelins behind it is the Aztec hieroglyph for war (at the right, above), and the temple in flames (at the right, below, note the smoke curls) denotes conquest.

The name of the town conquered appears to the left of the burning temple; it is the head of a man-eating cat, possibly the jaguar, surmounting a hill: *tecuani,* a "man-eating cat," and *tepec,* "hill or town." This picture, therefore, is to be interpreted as recording the conquest of the town of Tehuantepec, in southern Mexico, on the isthmus of the same name, by the ruler Ahuitzotl in 1502.

THE RECORD OF A TEMPLE'S DEDICATION

The picture on this page portrays the dedication of the great temple of Huitzilipochtli, the Aztec God of War, at Tenochtitlan, in 1484, at which human sacrifice is said to have been practiced for the first time. In the square above is a piece of flint and five dots, representing the year 5 Tecpatl, or 5 Flint, corresponding to 1484 A. D. To this is attached, on the right, the figure of a priest who has just sacrificed a human victim, the latter pictured as dying on the ground, weltering in his own blood.

To the left is the great temple of the War God, the stairway being shown as plentifully besprinkled with the gore of the hecatomb of victims. On top of the pyramid is a stone from which grows a cactus, this combination being the hieroglyph for Tenochtitlan.

HOW THE AZTEC RECORDED AN ECLIPSE

Figure *a* on page 119 shows an eclipse of the sun which was visible in the Valley of Mexico in 1510. Again the year is shown by the rabbit's head and the five dots in the square above—*i. e.,* 5 Tochtli, or 5 Rabbit (1510), from which hangs the sun's disk with a sector bitten out of it, the Aztec hieroglyph denoting an eclipse.

Figure *b* on page 119 represents a comet which swept over Mexico in 1489. Above, the year 10 Calli, or 10 House, is recorded, which corresponded with the year 1489 of the Christian era. Attached to the year is the hieroglyph for a comet, happily represented by the Aztec as a large serpent stretching across the heavens.

Montezuma regarded this comet as an evil omen, presaging the downfall of himself and his race; so that three decades later, when Cortez landed in Mexico, the superstitious Indian ruler thought that the fair-skinned Spaniards were sons of the white-skinned, golden-haired Aztec god, Quetzalcoatl, and pursued such a vacillatory policy toward the invaders

that his empire was speedily destroyed and his people enslaved forever.

AN EARTHQUAKE ACCOMPANIED BY A VOLCANIC ERUPTION

The third figure, *c*, on this page, shows an earthquake accompanied by a volcanic eruption, which occurred in the Valley of Mexico in 1533. Above we see the year 2 Calli, or 2 House, corresponding to 1533 A. D. Below is a star, above which smoke scrolls are rising. The Aztec word for a volcanic eruption is smoke ascending to the stars, and this is the sign for it. At the bottom is a sign which means "movement" (ollin), applied to a speckled band which represents the earth, and a "movement of the earth" is very emphatically an earthquake.

Figure *d* on this page represents a heavy fall of snow which occurred in the town of Tlachquiahco in 1503.

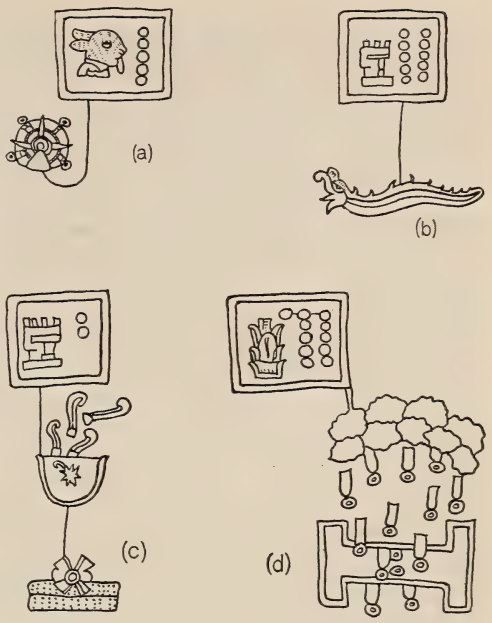
Above is the year 11 Acatl, or 11 Reed (1503), to which is attached a great bank of clouds, the snow. Below is an H-shaped object, the Aztec ball-court, *tlachtli,* covered with water symbols, *quiahuitl,* the rain; the combination of the two giving *tlach* (tli) *quiah* (uitl), the parts in parentheses being omitted in combination and the *co* being added as indicating a place: Tlachquiahco.

It was by means of such simple symbols as these, and all told there were not so many of them, that the Aztec were able to set forth the principal events of their history, to record and date the accessions and deaths of their rulers, their wars and conquests, and the tributes exacted from the conquered cities and towns of Anahuac (the ancient name for central Mexico).

They noted important religious ceremonials and extraordinary natural phenomena—earthquakes, volcanic eruptions, comets, and the like—and, finally, famines, pestilences, and migrations.

MAYA WRITING FAR MORE COMPLEX

In short, the Aztec hieroglyphic writing, of which we now read about 90 per cent of the characters, gives only a skeleton of history, the barest outline of principal events; but as for detailed descriptions, extended narratives, there are none—in fact, such were quite beyond



NATURAL PHENOMENA RECORDED IN THE AZTEC HIEROGLYPHIC MANUSCRIPTS

(*a*) An eclipse of the sun which took place in the year 5 Rabbit (1510 A. D.). The year is represented by the rabbit's head and the five dots in the square above, and the eclipse of the sun by the picture of the sun's disk with a sector bitten out of it.

(*b*) A comet which swept over the Valley of Mexico in the year 10 House (1489 A. D.). The year is represented in the square above and the comet by the serpent below.

(*c*) A volcanic eruption and earthquake in the year 2 House (1533 A. D.). The year appears in the square above. Below is a star with smoke curls rising above it, the sign for a volcanic eruption, the Aztec word for which is "smoke ascending to the stars." Below is the sign for an earthquake, a sort of winged eye, meaning "movement" (Aztec ollin), applied to the earth, the speckled rectangle.

(*d*) A heavy fall of snow which occurred in the province of Tlachquiahco in the year 11 Reed (1503 A. D.). The year appears above. The bank of clouds indicates the snow, and the H-shaped object below, covered with water symbols, is the hieroglyph for the province of Tlachquiahco.

the compass of its limited and simple symbols to express.

The Maya hieroglyphic writing presents greater problems in decipherment. To begin with, its characters are much more numerous, probably twice as many as in the Aztec writing, and at the same time they are much more complex.

Again, the Spanish priests and chroniclers of the 16th century have described

LUNCH AT THE RUINS OF NARANJO, PETEN, GUATEMALA

After a hot morning's work stumbling through the dense bush in search of new monuments, lunch taken on top of one of them is very grateful.

Courtesy of The Carnegie Institution of Washington

DRAWING A HIEROGLYPHIC INSCRIPTION ON A NEWLY TURNED MONUMENT IN PETEN

The figure on the monument is not posing for his picture, but was caught unaware by the expedition photographer while engaged in the intricacies of deciphering a newly found hieroglyphic inscription.

Courtesy of The Carnegie Institution of Washington

CHICLE HUNTERS RETURNING HOME AT THE END OF THE CHICLE SEASON EARLY IN THE SPRING

The milk of the chico-sapote tree, from which chewing-gum is made, runs only during the rainy season, from June to January, inclusive, during which time the chicle-bleeders are in the bush. At the end of the season they return to their homes for three or four months, to spend in a fortnight all they have so laboriously earned during the past seven or eight months, and then to live on credit until the beginning of the next season. This picture shows a group of 150 chicle-bleeders being picked up at a camp on the San Pedro Martir River, in Peten, to be carried down stream to their various villages. They travel with all conceivable impedimenta, from an umbrella to a pet monkey, and are of both sexes and all ages.

at considerable length the Aztec graphic system, whereas only one authority, Bishop Diego de Landa, has written anything detailed about the Maya writing. And, finally, although nearly two score Aztec hieroglyphic manuscripts or books have come down to us, only three Maya ones have been found: The Dresden Codex, at the Royal Library at Dresden; the Tro-Cortesianus Codex, at the Royal Academy of History, Madrid, and the Peresianus Codex, at the Biblioteque National, Paris.

These several factors have made the problems involved in its complete decipherment more difficult than that of the Aztec, and have left us more in the dark as to the subjects covered in the Maya inscriptions.

The Maya hieroglyphic writing is composed of about 400 different characters or elements, of which probably as high as 90 to 95 per cent are ideographic rather than phonetic, as has been explained.

These four hundred odd basic elements, however, are combined in about half as many common compound characters, about half of which in turn have been deciphered; so that it may be fairly claimed that the Maya inscriptions no longer are a sealed book to us. Although much remains to be done in this important line of investigation, already enough characters have had their meanings determined so that we begin to catch the general drift of these records, even if the details still escape us.

MARVELOUS ACCURACY SHOWN IN MAYA CALENDAR

So far as the Maya inscriptions have been deciphered, they deal exclusively

Photograph from the Biologia Centrali-Americana

REPRESENTATION OF A BLOOD-LETTING CEREMONY

This sculptured panel, now in the British Museum, was originally carved on the under side of a door lintel in one of the temples of the great Maya city of Yaxchilan, in southern Mexico. A priest with a ceremonial staff is shown at the left, supervising a blood-letting ceremony, possibly by a neophyte, who is kneeling at the right. Note the gorgeous details of the priest's costume. The neophyte, scarcely less handsomely garbed, is engaged in drawing blood from himself by passing through a slit in his tongue a long piece of rope with sharp thorns fastened to it. A basin on the ground catches the drops of blood as they fall.

Courtesy of The Carnegie Institution of Washington

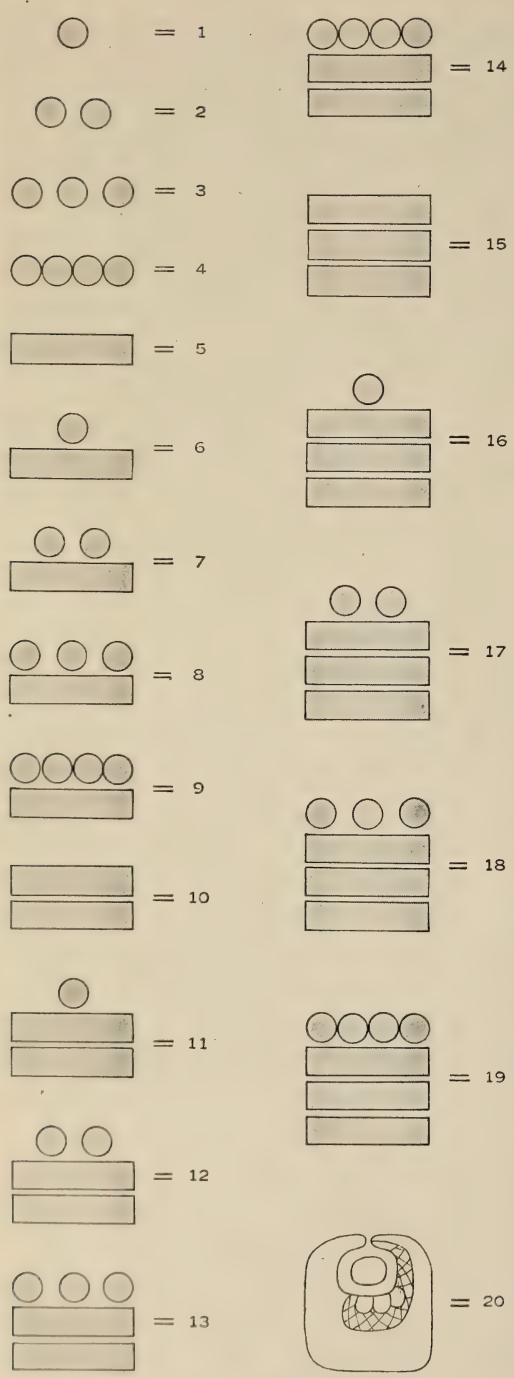
ALTAR 2, AT THE RUINS OF CANCUEN, GUATEMALA

This altar was discovered in 1915, at the ruins of Cancuen, on the east bank of the Pasión River, in southern central Peten. It is 2 feet in diameter and 7 inches in thickness and the sculpture on the top represents two priests officiating at an altar (the disk between them). The first two hieroglyphs at the top give its date as 9.18.5.0.0 4 Ahau 13 Ceh of the Maya era (536 A. D.).

with the counting of time in one phase or another. They record with extraordinary accuracy the dates of the monuments upon which they are engraved, so that no confusion exists between any two days within a period of more than 370,000 years.

They set forth elaborate lunar or moon calendars, in which the lunar month, involving a very difficult fractional number, is delicately and exactly coördinated with the solar calendar over long periods of time. They predict eclipses and correctly record the movements and phases of the planets, especially Venus; and, in addition to the foregoing, there is a wealth of other chronological data of as yet unknown significance.

Whether this last refers to historical events or astronomical phenomena has



THE MAYA "ROMAN NUMERALS"

In the Maya bar and dot numerals, the dot stands for 1 and the bar for 5. These elements, when added together in the proper combinations, give the numbers from 6 to 19, inclusive. The number 20 is shown at the bottom of the second column. It is also the hieroglyph for the moon.

not yet been determined, though doubtless the still undeciphered hieroglyphs will clear up this point when their meanings shall have been worked out.

It is evident from the foregoing that the element of time was of primary importance to the ancient Maya, and that its record, as variously manifested by the sun, moon, and planets, fills a large part of their inscriptions.

MAYA ARITHMETIC

Let us next examine, then, some of the features of Maya arithmetic and see how these chronological and astronomical facts were expressed.

First, the Maya, like ourselves, had two different ways of writing their numbers, one by bars and dots, and the other by different types of the human head. The former may be likened to our Roman numerals, and the latter to our Arabic numerals.

The Maya "Roman notation" made use of but two elements, the dot standing for the number 1 and the bar standing for the number 5. In this respect, at least, their bar and dot numerals were even simpler than our Roman numbers, since we have to use seven letters—I, V, X, L, C, D, and M—in the Roman notation. By various combinations of these two elements, in which the dot had the value of 1 and the bar of 5, the Maya wrote the numbers from 1 to 19, inclusive (see the examples of bar and dot numerals on this page).

The Maya "Arabic notation" made use of 13 different types of human heads to express the numbers 1 to 13, inclusive; and then, by applying the essential characteristic of the head for 10, a fleshless lower jaw to the heads for 4, 5, 6, 7, 8, and 9, they formed the numbers 14, 15, 16, 17, 18, and 19, respectively (see the examples of head numerals on the opposite page).

One peculiar feature of this notation was the use of two kinds of heads for the number 13—the simple form shown at the bottom of the first column on page 125, and the compound form, 3 + 10, shown at the top of the second column. The use of the latter, however, was very rare, there not being more than two or three examples of it known.

The higher numbers were expressed

by positions from bottom to top in a column. Just as in our decimal system the positions increase by a ratio of 10 from left or right of the decimal point, viz., units, tens, hundreds, thousands, etc., so the Maya positions increased by a ratio of 20 from bottom to top in a column, in all places except the third, which, instead of being 400, *i. e.*, 1 x 20 x 20, was 360, *i. e.*, 1 x 20 x 18. This single break in an otherwise perfect vigesimal system of numeration was doubtless due to the desire to bring its third term as near to the length of the solar year as possible, 360 being much nearer to 365¼ than 400. Examples of higher numbers are given on page 126.

LITTLE OR NO HISTORICAL MATTER IN MAYA WRITINGS

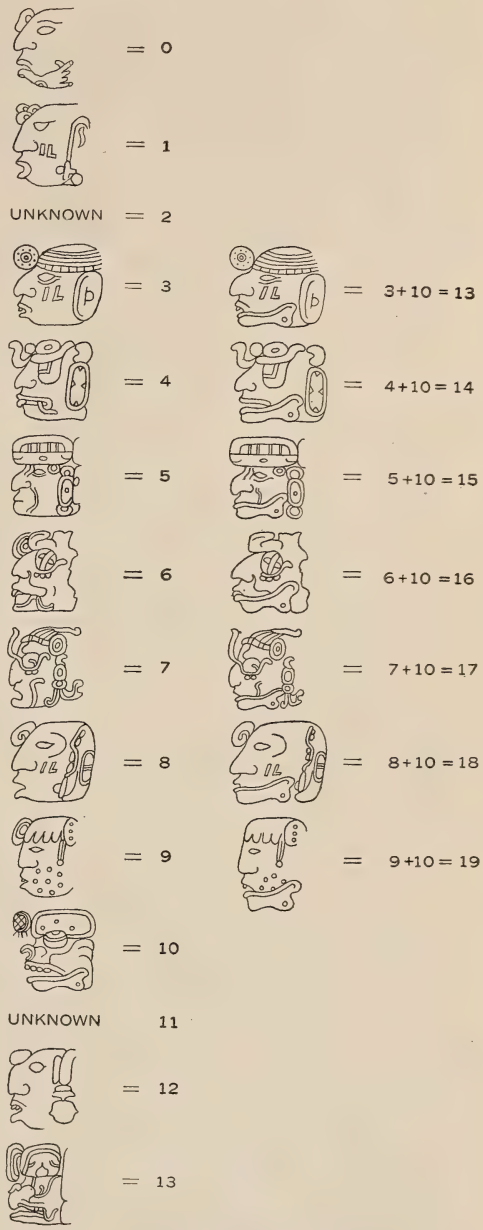
It was stated that in so far as they have been deciphered, and it is now possible to read nearly one-half of the Maya hieroglyphs, the Maya inscriptions have been found to deal exclusively with the counting of time in one way or another.

No grandiloquent record of earthly glory these. No bombastic chronicles of kingly pomp and pageantry, like most of the Assyrian, Babylonian, and Egyptian inscriptions. On the contrary, the Maya priests would seem to have been concerned with more substantial matters, such as the observation and record of astronomical phenomena. Of first importance to them would appear to have been the dates of the many monuments they erected.

These dates are usually recorded at the beginnings of the inscriptions, and are frequently of such accuracy as to fix their positions within a period of some 370,000 years, surely not an inconsiderable achievement for any time-count, even one of modern origin.

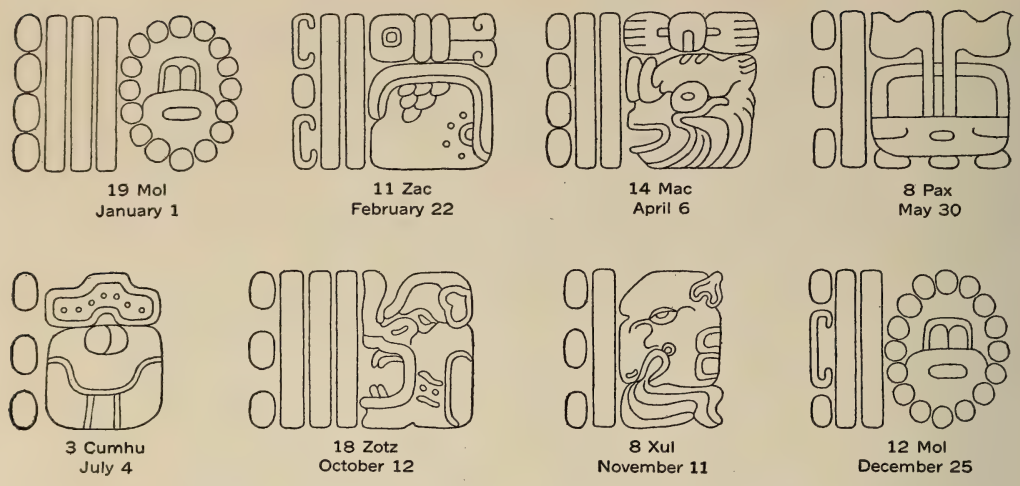
THE MAYA ERECTED THEIR MONUMENTS AT INTERVALS OF EVERY 1,800 DAYS

The Maya monuments, it has been ascertained from their dates, were erected at intervals of every 1,800 days—nearly five years. This custom seems to have been so general that on several occasions, when monuments commemorating specific 5-year periods at certain cities were missing, it has been



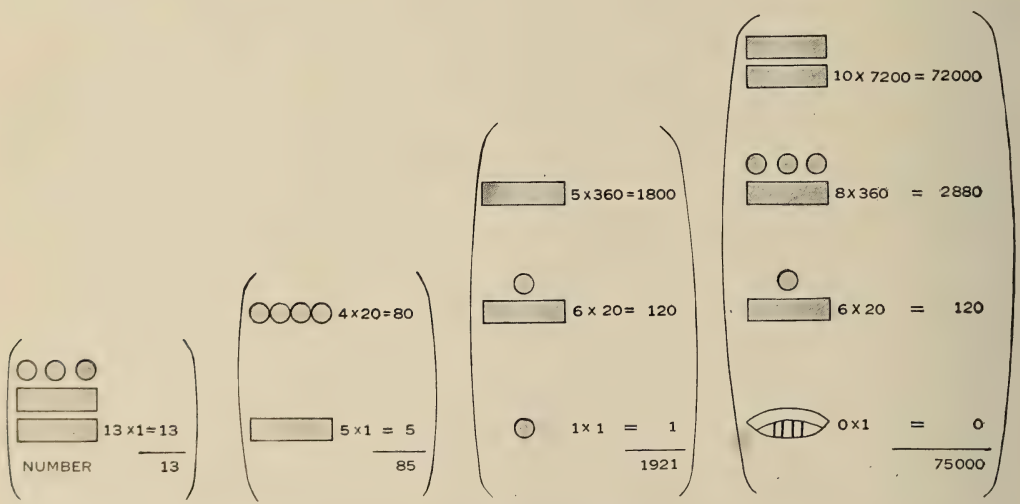
THE MAYA "ARABIC NUMERALS"

In the Maya head numerals there are 14 different types of human heads, representing the numbers from 0 to 13, inclusive, although the heads for two of these numbers, 2 and 11, have not yet been deciphered. The numerals from 13 to 19, inclusive, were formed by adding the essential characteristic of the head for 10—*i. e.*, the fleshless lower jaw—to the heads for 3 to 9, inclusive. Thus, for example, adding the fleshless lower jaw of the head for 10 to the head for 6, characterized by the "crossed bands" in the eye, gives the head for 16, viz., 10 + 6 = 16.



THE MAYA EQUIVALENTS FOR OUR PRINCIPAL HOLIDAYS

Every day of the Maya year had its corresponding hieroglyph. In 1566, when Bishop Landa wrote his famous "History of the Things of Yucatan," the Maya year began on July 16 (Old Style) or July 26 (New Style). On the basis of this correlation the Mayan equivalents for some of our principal holidays are given above, the numbers in bars and dots at the left indicating the positions in the months, and the signs to the right the names of the corresponding Maya months.



THE HIGHER MAYA NUMBERS

Our own arithmetical system is decimal, the values of the terms increasing from left or right of the decimal point in a ratio of 10. The Maya arithmetical system was vigesimal—that is, the values of the terms increased from bottom to top in a ratio of 20, except in the case of the third term, which was 360 (*i. e.*, $1 \times 20 \times 18$) instead of 400 (*i. e.*, $1 \times 20 \times 20$). This break in an otherwise perfect vigesimal system was probably due to the desire to bring its third term as near to the length of the solar year as possible.

The first number above is 13, *i. e.*, 13 units of the first order, or 13×1. The second number is 85, which the Maya wrote as 5 units of the first order, or 5, and 4 units of the second order, or $4 \times 1 \times 20 = 80$; and $5 + 80 = 85$. The third number is 1,921, *i. e.*, 1 unit of the first order, 6 units of the second order ($6 \times 1 \times 20 = 120$), and 5 units of the third order ($5 \times 1 \times 20 \times 18 = 1{,}800$); all of which, added together, give $1 + 120 + 1{,}800 = 1{,}921$. The fourth number is 75,000, *i. e.*, 0 units of the first order, 6 units of the second order ($6 \times 1 \times 20 = 120$), 8 units of the third order ($8 \times 1 \times 20 \times 18 = 2{,}880$), and 10 units of the fourth order ($10 \times 1 \times 20 \times 18 \times 20 = 72{,}000$); all of which, added together, give $0 + 120 + 2{,}880 + 72{,}000 = 75{,}000$. By this method the Maya could write numbers as high as 64,000,000.

possible, first to predict their existence and later to have found them. Indeed, these intricately carved monoliths are probably to be regarded as little more than 5-year almanacs in stone, which set forth not only the dates of their erection or dedication, but also important lunar and planetary phenomena as well.

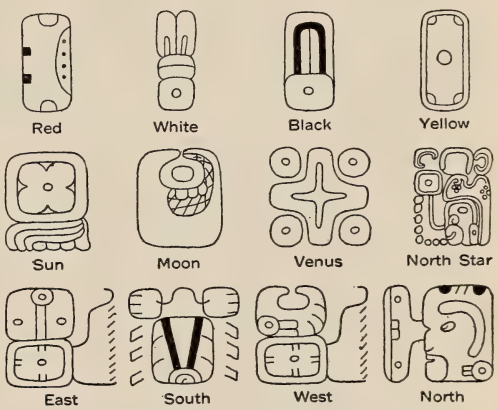
An example of this kind occurred at the ruins of Piedras Negras last May. After the Carnegie Expedition had been at this site a week, it was found that there was a corresponding monument for every 5-year period from 378 to 536 A. D., save only for the 5-year period ending in 487 A. D.

The writer, on the basis of this condition, predicted that a monument would surely be found bearing this date; and on May 22 Mr. O. G. Ricketson, Jr., who was mapping the city, discovered the beautiful stela shown on page 129, which the inscription on its side shows was erected in 9. 15. 15. 0. 0 9 Ahau 18 Xul (487 A. D.), thus making the series of period-markers at this city complete for 158 years.

This new monument, which was named Stela 40, is 16 feet high, 4 feet wide, and 1½ feet in thickness. It represents Yum Kax, Lord of the Harvests, sowing corn. The God is seen dropping grains of corn from his extended right hand, the left holding the bag from which he has taken them. His head-dress, in keeping with his character of the Corn God, is a conventionalized ear of corn. Below there is a large human head and shoulders upon which the corn is falling. Could this have been a Maya conception of the Earth Mother receiving the seed she is to fructify?

THE PRINCIPAL GODS OF THE ANCIENT MAYA

There were not less than twelve major deities in the Maya Pantheon. The four most important are represented here with their name hieroglyphs below them. From left to right they are: Itzamna, the Mayan Jupiter and the Father of Mankind; Kukulcan, the Feathered Serpent, Culture Hero of the Itza nation; Ahpuch, the Lord of Death (note the fleshless lower jaw used in the head numbers for 10, 14, 15, 16, 17, 18, and 19); and Yum Kax, Lord of the Harvest, his head-dress representing a conventionalized ear of corn.



OTHER MAYA HIEROGLYPHS

Top row, certain colors; middle row, certain heavenly bodies; bottom row, the cardinal points.

"THE HOTUN," A GREAT NATIONAL HOLIDAY

This prediction of the existence of monuments in advance of their actual discovery has been repeated elsewhere, notably at Quirigua and Naranjo, where the sequence of the 5-year period-markers was at first incomplete, as in the case of Piedras Negras, subsequent discoveries, however, having filled in the gaps. Indeed, the writer regards the discovery of the principle which governed the erection of the Maya monuments, namely the 5-year interval, as one of the most important contributions to the subject during the past decade.

A name has been invented for this period, "hotun," the Maya word for "5 tuns" or 5 of their 360-day periods, and its hieroglyph has been identified.

The prevalence of this practice of erecting period-markers throughout the Old

Courtesy of the Peabody Museum of Harvard University

FOUR MAYA MONUMENTS OF DIFFERENT AGES, SHOWING THE DEVELOPMENT OF STONE-CARVING DURING THE OLD MAYA EMPIRE

The first monument (Stela 3, at Tical) dates from 229 A. D.; the second (Stela 25, at Naranjo) is 125 years later, dating from 354 A. D.; the third (Stela B, at Copan) is 118 years later than the second, dating from 472 A. D.; the fourth (Stela 10, at Seibal) is 118 years later than the third and dates from 590 A. D.

Empire and its persistence down to the time of the Spanish Conquest, in 1541, calls up an interesting picture. We may imagine the closing day of these 5-year periods as great religious festivals. The inhabitants from the surrounding countryside gathered in the nearest city to attend the dedication of the monument, which had been prepared so laboriously and painstakingly under the supervision of the priests during the previous five years.

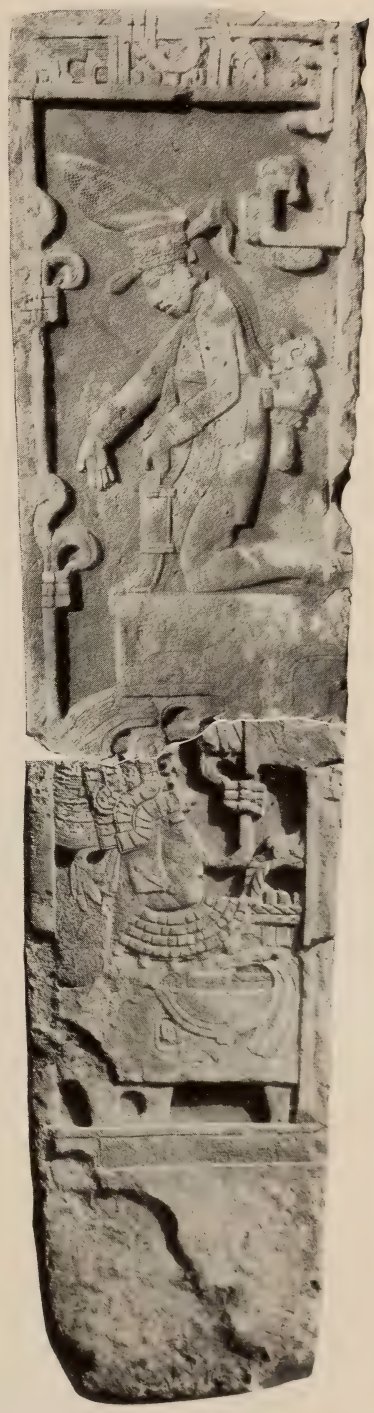
They could not read the hieroglyphic writing, it is true, but during the dedication ceremonies the priests doubtless informed them of the various astronomical phenomena of which they treated. With prayers to the gods for rain and fertility, with sacrifices and probably religious dances, the current period-marker was formally dedicated, perhaps we may even say "unveiled."

A parallel case would be as if on the 31st of December every fifth year, say in 1915, in 1920, in 1925, the inhabitants of our larger cities should congregate in the principal squares or plazas of their respective centers, and under their city authorities and clergy formally dedicate monuments commemorating the principal events of the past 5 years, this same ceremony being held all over the country on the same day. It was in fact a great national festival, possibly indeed the greatest national holiday of the ancient Maya.

When it is remembered that all the beautiful carvings found on these period-markers were made with tools of stone only, since the Maya of that time had no metals, the magnitude of their achievement grows and we are lost in wonder at the ingenuity and brilliance of this great native American people.

THE MAYA INSCRIPTIONS PRINCIPALLY ASTRONOMICAL AND CHRONOLOGICAL

It is becoming increasingly apparent, as we press our way into the meaning of the still undeciphered hieroglyphs, that they deal more and more with the subject-matter of astronomy and less and less with that of history. So much so, in fact, that if historical data be present at all on the Maya monuments, they must be confined to brief allusions to the more important events, as in the case of the Aztec manuscripts already described.



Courtesy of The Carnegie Institution of Washington

THE CORN GOD SOWING GRAINS OF THE MAYA STAFF OF LIFE

This is one of the finest examples of Maya stone-carving that has come down to us. It was discovered May 22, 1921, at the city of Piedras Negras, Guatemala (see text, page 127).

DESTRUCTION OF THE WORLD BY FLOOD AS REPRESENTED IN A MAYA HIEROGLYPHIC MANUSCRIPT

The above illustration shows the destruction of the world by water as depicted in the Dresden Codex (see page 121).

Across the sky stretches a great serpent belching forth torrents of water. From his body hang the sun and moon, both shown as in eclipse (note the black and white wings on each side of them), streams of water also pouring down from them.

Below the serpent is the old Tiger-clawed Goddess with a snake head-dress. On her skirt is broidered a pair of cross-bones—our own modern symbol for death. She holds a water-jar upside down, from which gushes another torrent of water.

Finally, below is the Black Captain, the Maya God of War, the Moan, a bird of ill omen, perched upon his head, down-pointing arrows and a javelin in his hands.

And it must be remembered in this connection that no Maya signs of abstract general meaning, like those in group 3 of the Aztec signs, have as yet been deciphered, and only a very few of group 2, namely, the signs for the names of the principal deities (see page 127).

If, therefore, as now seems probable, we must abandon the idea that the ancient Maya recorded history in their inscriptions, save only in very abbreviated and synoptical allusions to the more important events, we may, on the other hand, console ourselves with the reflection that possibly they were more worthily employed in recording matters of scientific moment, such as the movements of the heavenly bodies.

So accurate, indeed, would appear to have been their observations in this particular field that before long we shall probably know the ages of the different Maya cities more exactly than we will ever know the ages of Babylon, Nineveh, Memphis, Thebes, Athens, or even of Imperial Rome herself.

MAYA CHRONOLOGY, THE TIME "YARDSTICK" FOR ALL ASSOCIATED CULTURES

Finally, this greatest aboriginal American writing provides us with a system of counting time, a chronological yardstick, as it were, by means of which it will eventually be possible to date all the contiguous ancient American civilizations as far south as the great cultures of Peru, the Inca,* etc., and as far north as the Pueblo culture of our own Southwest.

Indeed, the writer regards it as not only possible, but even probable, that the comprehensive excavations now being undertaken by the National Geographic Society at Pueblo Bonito, Chaco Cañon, New Mexico, may at any time bring to light specimens, pieces of pottery brought in by trade in ancient times from central Mexico, which in turn will be datable in the Maya chronological system, and hence in our own Christian era.

* See in the NATIONAL GEOGRAPHIC MAGAZINE "Explorations in Peru," April, 1912; "In the Wonderland of Peru," by Col. Hiram Bingham, April, 1913; "The Story of Macchu Pichu," by Col. Hiram Bingham, February, 1915; "Further Explorations in the Land of the Incas," by Col. Hiram Bingham, and "Staircase Farms of the Ancients," by O. F. Cook, May, 1916.

THE JUNGLES OF PANAMA

By David Fairchild

Agricultural Explorer in Charge of Foreign Seed and Plant Introduction, Department of Agriculture, Author of "Forming New Fashions in Foods," "A Hunter of Plants," "New Plant Immigrants," etc., in the National Geographic Magazine

THE more I thought about it, the more it seemed to me important that my boy should, before his habits of thought and life had become conventionalized, feel the grip of one of the most tremendous of all experiences, that of being all alone in a tropical jungle.

I remembered how my own experiences in the forests of Java had formed a sort of background to all the later experiences of my life and had given me a different outlook upon the world. In the years since then there has been a perpetual longing to return, a longing full of bright sunshine, shady forest scenes, singing birds, strange insect lives, and the mystery of the moonlight through the palms.

Panama somehow had not occurred to me, even though in 1898 I had crossed the Isthmus. It had become, to my mind, a canal, a place of hospital buildings, locks, sanitary inspectors, and fortifications. The tourists who came back from there told nothing of the jungle; they either had not seen any or were not impressed by it. The tourist to Miami talked more about the tropical hammock than the tourist to Panama about the jungle.

But the fact that there was no malaria in the Canal Zone and that we could live there as safely as at home finally riveted our attention upon Panama and we began to analyze its possibilities.

ARRIVAL AT THE JUNGLE

It was summer, midsummer, and one friend wrote: "Why do you think of going to Panama in the hurricane season and the rainy season; it's the worst time to go." Another questioned whether there were any butterflies or any flowers to be seen in the rainy season. But we talked to the men who knew about these things and made up our minds that Panama was the place to visit, and after we left Norfolk every interview on board and every knot the steamer made nearer to the Canal convinced us that we had made no mistake.

To drop your office papers on Wednesday, land at a tropical waterfront a week from the following day, and be chasing butterflies in a gorgeous tropical jungle on Friday was the experience which surpassed anything we had imagined possible. We had had barely time to change our clothes, as it were, before we were actually in that far-away, mysterious place which most people think of as so remote that they can never hope to go there. It was a foretaste of those swift changes of environment which will soon be the common experience of the race when the highway overhead is really opened.

The cool morning ride to Gamboa, past yam patches and cassava fields, with their background of palms and tangled forests, every plant dripping and green, was the first thrill. Then came an eight-mile launch ride up the Chagres to Juan Mina, with superb green hillsides covered with that incomparable mixture of forest trees loaded with hanging vines which is associated only with a heavy rainfall near the Equator.

AS IN A WORLD BEFORE THE ADVENT OF MAN

"Me for the tropics!" was the boy's exclamation, and so swiftly did he disappear up the jungle trail that it was not until two hours later, when he failed to show up, that I realized that I was not quite sure he might not stray too far from the trail itself and be lost in a forest which stretches away for hundreds of miles toward Costa Rica.

It is a gripping experience and a bit frightening suddenly to find, not houses and lamp-posts and the noisy people who have composed the customary environment and whom one understands, but in every direction and everywhere strange, silent tree trunks, no two alike.

I felt as though I were in the world as it was before man existed. I was where life teems and new forms develop, in the midst of that living stuff up out of which

Photograph by H. Wimmer

A JUNGLE ROAD IN PANAMA

Rank, weedy vegetation and a general unkempt appearance characterize the fringe of the jungle such as that along this primitive road. The plants swarm with insect and fungus parasites, and lianas hang like ropes from the tops of the trees. It is much like a wood road in our South in midsummer.

Photographs by H. G. Cornthwaite

IN THE TREETOPS OF THE JUNGLES OF PANAMA

At the left are nests of weaver-birds, which resemble the oriole nests of the north, hanging in clusters on a tree in Gatun Lake. Often they are built side by side with the nests of wasps and bees, and the stinging insects are said to protect the birds from reptiles. In the center is an old termite (white ant) nest with a strangler fig vine growing over it. Such dark-brown nests swarm with soldiers and workers which have squirt-guns in their heads; when disturbed they eject a fluid whose unpleasant odor is obnoxious to their enemies. These are not mushroom-growing ants. At the right is a large cuipo tree (see page 134) in the dry season. In the branches are the hanging nests of weaver-birds.

Photograph by H. Pittier

THE STATELY CUIPO TREE OF PANAMA

It is a shock to learn that this stately forest monarch, *Cavanillesia platanifolia,* which is one of the striking features of the Panama landscape, is worthless as a timber tree, having wood too soft and spongy to be of any value—at least no use has yet been found for it.

man came ages ago—alone among millions of living, silent creatures. It is one thing to be alone in the desert or at sea and quite another to be alone in the jungle, buried in the very bosom of that great something out of which all life has come.

The world of human beings ceased to be what it had been to me and became merely a fringe of the great life of the world. Things are happening here in this great silent reservoir of life, and these are just as important as those which take place on city streets.

Looking up, we saw the feathery leaves and flowers of the tall, gray-trunked trees or the drooping leaflets of tall, slender palms, or creepers of every imaginable form.

Looking down, there were seedlings everywhere—palm seedlings, hundreds of them, coming up from where a bunch of the palm fruit fell and rotted. Ferns of beautiful strange forms and selaginellas cover the fallen trunks and palm stems.

We could not tread a single step off the trail without stepping on some tender little seedling which was as confidently raising its head in the deep shade and constant moisture of the forest floor as if it were on a greenhouse bench.

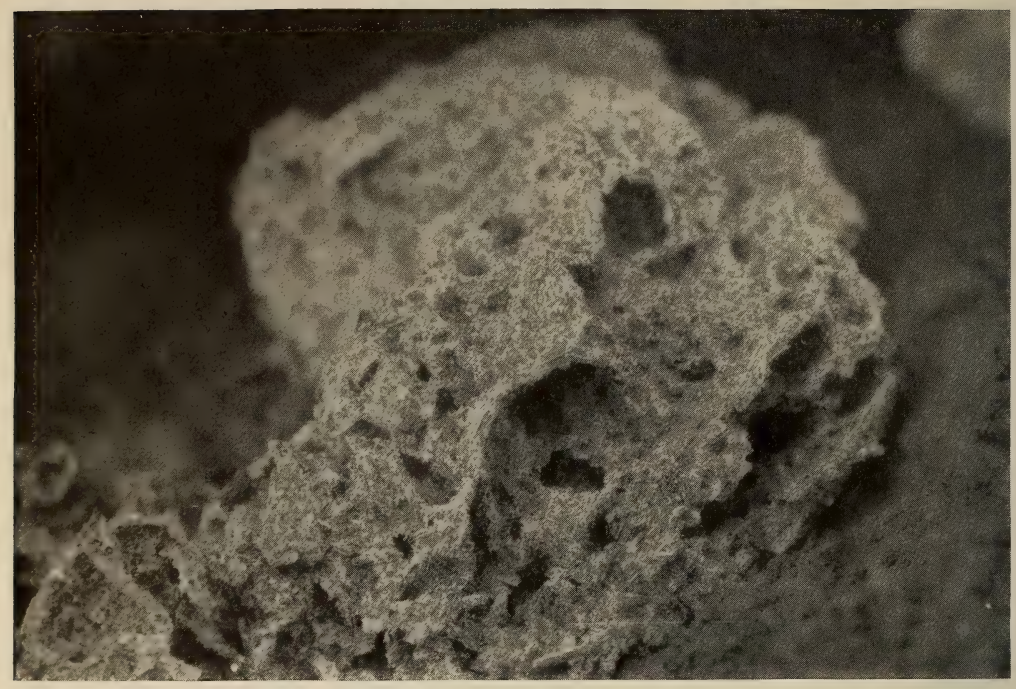
DEATH AND DESTRUCTION STALK IN THE JUNGLE

You may imagine that the plants in a jungle are healthy. Far from it! A look around will soon show that there is hardly a leaf in sight which has not some insect-made hole through it. I stood still just off the trail and picked all the leaves within my reach, until I had a handful. Some were so riddled with holes that they looked like lacework; others so tunneled by leaf miners that they looked like gray-green puffed-up bags. Some were spotted with fungus leaf spots;

Photograph by H. G. Cornthwaite

THE STRANGLER FICUS AND ITS VICTIM: PANAMA

From a tiny seed dropped by some bird in the branches of this giant forest tree, there grew a little "rubber" plant, which dropped in time a thread-like rootlet to the ground. This rootlet grew and thickened to a trunk and sent out other rootlets by the dozens, until they quite inclosed the forest tree itself, and some day they will choke it.



Photograph by David Fairchild

THE MUSHROOM SPAWN OF A LEAF-CUTTING ANT: PANAMA

On the floor of a miniature cave is piled this gray mushroom spawn, kept perpetually growing by the leaf fragments brought to it by the atta ants. Everywhere, scattered over the spawn, are the clusters of glistening white mushrooms which form the food of the baby attas (see text, page 139).

others covered with lichens and parasitic algæ.

It was hard to understand why, with all of these diseases rampant, the place should look, not like a plant hospital, but more like a nursery of plants which were all being given the best conditions for growth. There would appear to be enough parasites to wipe out the forest in a few years were things not so nicely balanced, parasites living upon parasites, insects hunting insects.

Every plant pathologist should visit the tropics and take a lesson from the jungle, for if it teaches any one thing it is that inherited resistance to disease and the setting of an insect to catch an insect are the two ways which the jungle species take to escape from their enemies.

THE PHENOMENON OF FATIGUE IN THE TROPICS

Having gone to the tropics in midsummer, it was natural to try to analyze the climatic differences between the banks of the Potomac in August and the banks of the Chagres. I became convinced that the ordinary tools of climatology are not sensitive enough to analyze this difference, just as the chemist's balance can often detect no chemical difference between objects that are easily distinguishable to the palate.

There is a tropical fatigue phenomenon which some people exhibit more quickly than others and which women apparently show sooner than men. Just what it is I do not know, but its results are easily observable. They come generally in the hours between noon and 5 o'clock in the afternoon, and are to the brain what old age is to the eyes. Not only did my eyes blur and have to be rubbed to clear them, but a kind of haziness of fatigue attacked my brain in the afternoon, and try as I would I could not shake it off.

In the morning hours, from 6 to 12, the conditions for active brain-work seemed ideal and I felt ambitious and keen to do things, and there was gener-

ally a period of clear thinking in the cool of the early evening, but from 12 to 4 or 5, there was a pronounced period of extreme fatigue. I wonder if the physiologists have analyzed this effect of a tropical climate, and whether the hours of employment in the tropics really conform to the hours of greatest efficiency.

Hahn remarks in his Climatology that "high average warmth, combined with a high degree of moisture, makes the organism sensitive to slight fluctuations of temperature. In dry climates, on the other hand, the organism withstands great changes in temperature without ill effects."

This is in accord with the surprising experience of cold which one feels in the early morning in the tropics, and also explains why if you stand in the shade at the edge of the jungle and the slightest breeze strikes you, it gives you a perfectly delightful feeling of comfort. If you make the slightest exertion your clothes become wringing wet and your glasses are continually covered with moisture.

You get so thirsty that you feel as if there were no limit to what you could drink, and as the cool water trickles down your throat you are almost ready to declare that it is worth a trip to Panama just to have the experience of quenching such a thirst!

PANAMA'S JUNGLES AMONG MOST WONDERFUL IN THE WORLD

The jungles of Panama are among the most wonderful in the world, so far as vegetation goes. They are not inhabited by tigers and elephants, as are those of Burma and Siam. They do not have gorillas, as do the jungles of Central Africa; they have not the rhinoceros of Java and Sumatra, but the boa-constrictor is there, and they swarm with those brilliantly colored antediluvian lizards, the iguanas; flocks of parrots and parrakeets, and toucans abound. Droves of small monkeys live in the tree-tops, while those weird insects, the leaf-cutting ants, cut their broad pathways like miniature highways of travel criss-cross through its tangled undergrowth.

But it is as rain forests that the jungles on the Chagres might be classed among the most remarkable of the world. They are produced by a rainfall which is, according to Hahn, nearly three times that of Rio de Janeiro, twice that of Guatemala City, about twice that of Bangkok or Calcutta, of Port au Prince and Porto Rico, nearly half as much again as Colombia or Hongkong, and considerably greater than Paramaribo, in Dutch Guiana. It is, furthermore, almost double that on the near-by heights of Balboa.

And here we were actually in this magnificent rain forest, in the cool of the early morning.

A MINIATURE FACE IN THE TREE TOPS

Not a whisper of wind was stirring. Bands of sunlight crossed the trail like those that penetrate a darkened room, illuminating the very air and making it alive with particles of matter. We stood and listened and looked.

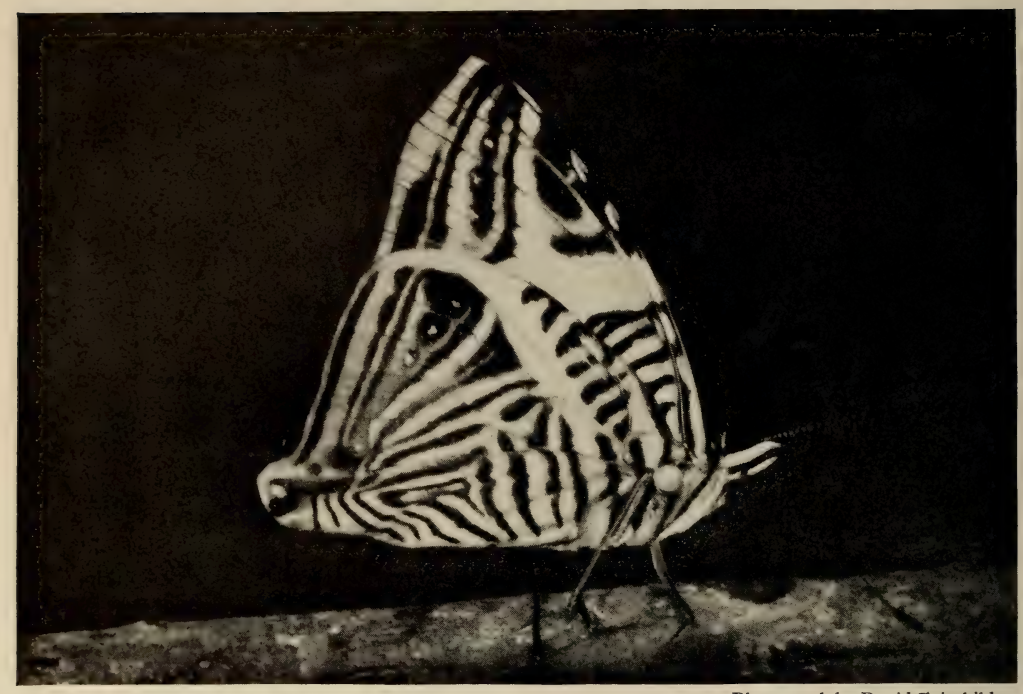
So instinctively does the human eye catch the slightest movement of an object among others which are still, that although millions of leaves shut us in on every side, we both saw instantly a moving leaf in a tree-top from behind which there peered out at us a miniature face.

We recognized at once that this creature with the great brown eyes had a quality that the insects on the trail beneath our feet had not. Suddenly we had come into the presence of a form of jungle life which had at least a resemblance to the form which is covering the globe with cities and cutting down the forests.

It is strange to speculate about this greatest of occurrences—the arrival in the animal world of that organ, the brain, which came into existence, or at any rate found its great beginning, in the tree-tops of a tropical rain forest.

There we two descendants on the ground stood staring at the tiny descendant in the branches. How far, how incredibly far, our pathway of descent had taken us in the thousands, perhaps millions, of years since those days in some tropical rain forest when the first super-apes, more intellectual than the rest, broke into the swift pace of evolution which led to man!

And how that creature in the tree-tops had lagged behind—so far behind that any kinship even seemed more imaginary than real. Yet intelligence was there—the spark, the something, that made of



Photograph by David Fairchild

WHICH WAY IS THE BUTTERFLY GOING?

If a bird sees it sitting on a branch, does the appearance of doubleheadedness deceive? And did the ancestors of this butterfly increase their chances of survival in the struggle for existence by their strange appearance, or is it just a coincidence? These questions are hard to decide experimentally.

that tiny creature a very different thing from the insect creatures of instinct at our feet, whose perfect organization is enough to "strike terror to the heart of any individualist."

ANTS THAT CULTIVATE MUSHROOMS FOR THEIR YOUNG

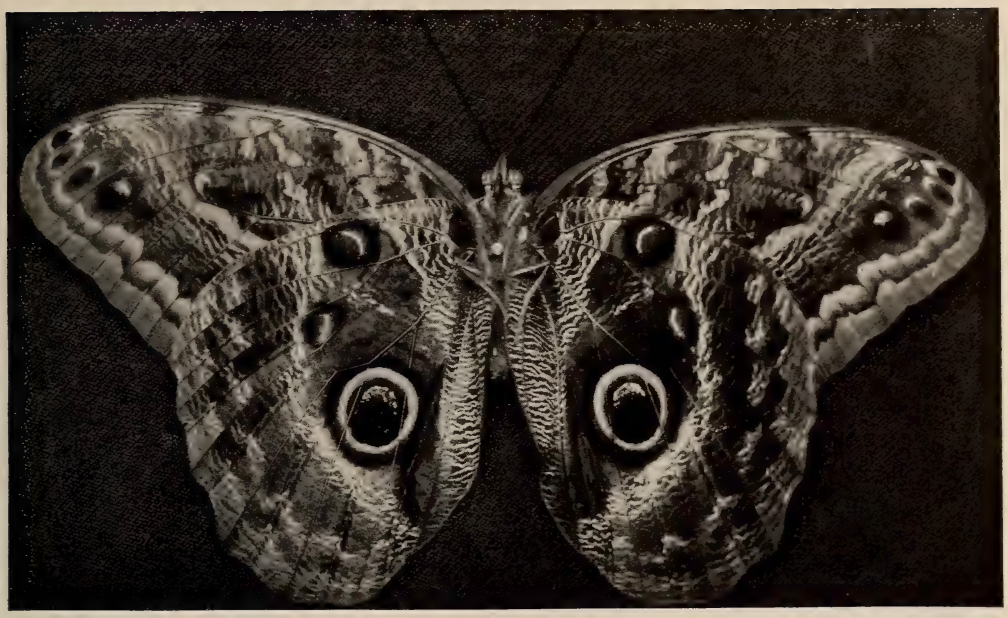
There are many differences, botanical and zoölogical, between the forests on the Chagres and the rain forests of the Malay Archipelago; but to me the most striking was right beneath my feet—the beaten trails of the attas, the leaf-cutting, mushroom-growing ants. There are none of these trails in the oriental jungle, for the atta does not inhabit them. There is a mushroom-growing insect in the East, a species of termite, or so-called white ant, which is not an ant at all; but the termites build covered mud runways and not open well-kept highways like these of the attas.

I wanted most of all, in coming to the Chagres, to have two experiences: I wanted to see a real boa-constrictor—see its long, trunk-like body move swiftly across the trail and watch it disappear among the trees, or look up into some tree-top and see its long, narrow head and the coils of its scaly body far above me in the forest—and I wanted to see the mushroom gardens of the attas.

The boa-constrictor is fast becoming a rare animal on the Chagres, and I did not see one; but I did have the pleasure of digging out an atta mushroom garden.

One may have watched an atta under a lens and have seen it deliberately scissor out a circular disk of green leaf, throw it over its head, and hurry down the leafy twig to the tree trunk or down to the ground, and then away, at the rate of two yards or so a minute, over a beaten highway as clear of leaves as a swept pavement and, compared with the size of the atta, as wide as a city street.

One may have watched it disappear into its hole in the ground, but until he has actually dug down deep into the stiff clay and found there, in subterranean caves, the mushroom beds of these creatures, he can scarcely realize the full



Photograph by David Fairchild

THE GREAT OWL BUTTERFLY WHICH FLIES AT DUSK: PANAMA

When the author first saw the wings of this remarkable butterfly through the camera as he took its photograph, he was startled by its resemblance to an owl's face. Its eye spots seemed almost luminescent and it could easily be imagined that an owl was flying at dusk. If held at arm's length and viewed with almost closed eyes, the reader can readily imagine he is looking at an owl.

length to which the strange force of instinct has carried them, whose form and probably whose gait has not changed in hundreds of thousands of years.

POSSIBLY THE WORLD'S FIRST "AGRICULTURISTS"

There, in the cavern, lies a mass of mushroom spawn as delicate to the touch as cobwebs are, and embedded in it everywhere are the bits of leaf brought by the attas, hundreds of yards over their highways, for its nourishment.

If you take this spawn carefully out into the sunlight, countless groups of sparkling, almost microscopic, bodies are apparent. These are the mushrooms. It is upon these that the baby attas feed. I wonder if these mushrooms are not the oldest cultivated plants in the world, and this cave agriculture of the attas the most ancient of all agricultures.

To enter the great tombs of Egypt and see the mummy cloth of a Pharaoh is to look at the handiwork of beings which lived three thousand years ago, but to open the mushroom cave of an atta is to come into the presence of an instinctive agricultural practice which probably began long before the Cave epoch of mankind and has been continued down to the present time.

There appear to be no weeds in the shape of other kinds of mushrooms growing in these nests. How do the attas keep them out, and does the crop ever get diseased, I wonder! It is things like these, which you feel have been going on uninterruptedly for eons with feverish haste, that make the jungle what it is, a place in which to think and wonder.

The little laboratory at Juan Mina, where we spent six days, stands in a citrus grove established there some years ago, and for naturalists to live and work in it is a wonderfully comfortable and convenient place. Carefully screened, equipped with running water and cooking-stove, it overlooks from a slight elevation the famous Chagres River, famous for its deadly black-water fevers, which in the days of the California gold seekers made the trail across the Isthmus, which passes through the jungle behind the laboratory,

Photograph by David Fairchild

A GIANT LIZARD, OR IGUANA, OF TABOGA, AN ANTEDILUVIAN REPTILE

The brilliant colors and the curious flopping horns along its spine make you sure that this creature is a left-over from the Age of Reptiles (see text, page 142).

one of the most dangerous spots in the world.

THE FEVER-BEARING MOSQUITO IS VANQUISHED

There was a curious thrill of pleasure in being near this spot and feeling safe, safe from that microscopic enemy which when I crossed the Isthmus before was wholly unidentified, unknown, but which now, through the investigations and activities of personal friends of mine, whose early plans and dreams I heard them talk about, is known and whose ways are understood. To those like L. O. Howard and Theobald Smith, whose scientific curiosity led them into this field of discovery, should go quite as much of credit as to the inventors and organizers like Gen. Gorgas, who mastered the mechanics of mosquito destruction.

I do not mean to give the impression that there is no fever left on the Chagres, for there is; but if one keeps behind well-built screens after sundown and before sunrise, which, according to Dr. Zetek, is the time when the female anopheles fly, the danger here is insignificant—no greater, perhaps, than danger from colds in northern climates.

GRASS PROBLEM APPALS THE PLANTER

A Florida orange-grower would turn gray if he had confronting him the problems which face any one who attempts to grow fruit in Panama.

The grass problem alone is enough to stagger the heart of the bravest planter. Think of your own vegetable garden in midsummer, when the days are steaming hot and the weeds are growing about as fast as you can pull them out; project these conditions indefinitely, for there is never any winter to check them, and you will get the endless vista of weeding which confronts the tropical planter.

Grass is certainly the curse of agriculture in the rainy tropics, and he who imagines tractor-work or the use of any of the ordinary tools of our northern agriculture in use on tropical farms should never lose sight of the grass.

There is really nothing so hopeless-looking to a northern fruit-grower as a little orchard in a clearing in a tropical jungle. The great forest insists on taking back the little clearing to itself, and it is one continual fight with a machete to keep it from doing so.

When I was shown what looked from the deck of a launch like virgin forest,

Photograph by David Fairchild

SIX GIANT LIZARDS, THE BAG OF A SUNDAY MORNING

Why any one who eats eels and terrapins and snails should shudder at the idea of eating lizards is hard to understand; but many do. To the Taboga people they are as great a delicacy as the terrapin is to us.

with great trees covered with creeping lianas, and was told that it had all grown up in eight years from cleared land, and when I recollected how fungus and insect pests haunt a clearing, I could better comprehend the feeling that, after all, for the individual of small means, there really is no other way to farm than to cut down and burn, plant and get a crop or two; then, when the plants and weeds of the returning forest drive you out, move on. It is the way of the native everywhere; clear a spot, rush in, rush out again, and let the land grow up to trees.

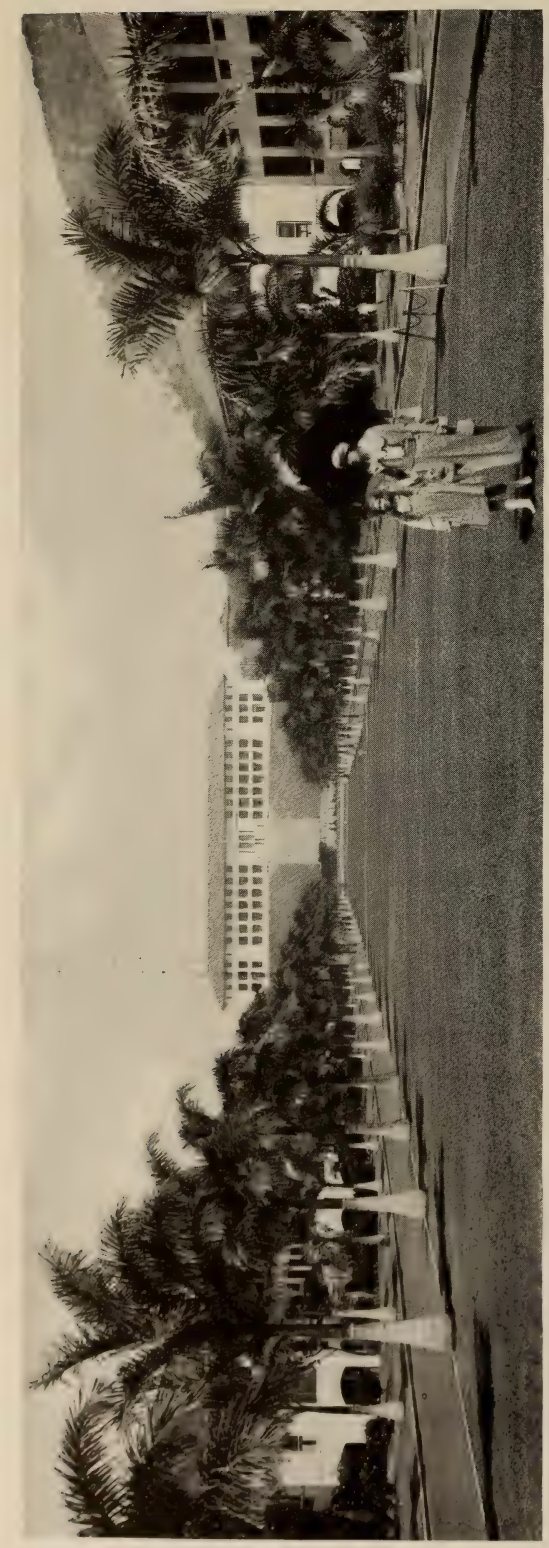
UP THE CHILIBRE RIVER IN A CAYUCO

To paddle up a strange river in a canoe is thrilling, even in the north; every turn in the stream opens a new vista. But to sit in a real dugout made from a giant tropical forest tree, with the beautifully developed, half-naked form of an Indian in front of you, where every move of his lithe body changes the shape of the brown statue before your eyes; to be so near the dark, still, swift water that your hand touches it and can pick up floating fruits as they pass, and noiselessly to thread your way under palms and great lianas up a tropical stream, is an experience of a lifetime.

Hushed by the stillness of everything, nerves keyed up by the instinct which comes when you take a gun in your hand, and guided by natives whose eyesight is so keen that they can see a green snake lying on a branch forty yards away, my son (Graham) and I pushed up the Chilibre, and up it to the Chilibrillo, in a cayuco.

Not in those parts of Java or Sumatra where I have been, nor in the South Sea Islands, nor anywhere around Rio, not even in the Moluccas, have I seen anything which approached the luxuriance of the banks of vegetation between which we were noiselessly gliding.

"Culebra! Culebra!" whispered the Indian in front of me, and we darted under overhanging branches to get a



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THE ADMINISTRATION BUILDING AND THE APPROACH THROUGH THE ROYAL PALM AVENUE: BALBOA, PANAMA

When will some genius of landscape gardening be given an opportunity to use the plant forms and colors of the tropics? This palm avenue will grow more stately with age. It is a fragment of the unfinished plans for the landscaping of Balboa.

closer view of a tree-snake which refused to come down, even after being shot at.

A few yards farther up stream one of those weird, unworldly green lizards lay flattened against a limb. A 22 shot brought it down into the undergrowth and we pulled into the slippery mud bank to get it. A parrot in all its gorgeous plumage is no more brilliant than one of these great lizards of the Chilibre. They must be seen before their colors fade to be appreciated; when stuffed they look like any other reptiles.

With varied luck and exciting incidents we pushed on to where the Chilibrillo enters the Chilibre and branched off into the smaller stream, so narrow that in places the fallen tree trunks almost blocked it, and as we stooped to avoid the hanging vegetation we involuntarily scanned it for snakes, which love to lie on the branches projecting over the water.

A NATIVE HOME IN THE JUNGLE

We left the stream and followed the Indians to a typical native house in a clearing in the jungle.

It was with a peculiar feeling of racial curiosity that I walked around this little farm-yard in the jungle on the Chilibrillo. There, in a hammock swung between the posts that supported the thatched roof, lounged the woman, and in the little patch of upland rice near by worked the man, cutting the long heads of half-ripe grain one by one with a small knife.

Photograph from Roscoe Searle

DEFEATED BY THE MOSQUITO AND ABANDONED TO THE JUNGLE

This French dredge was the giant of its time. It had to be abandoned, and the jungle has smothered it, because the engineers who built it had not counted on the mosquito. The discovery that the mosquito is a carrier of parasites constitutes the real beginning of the White Man's conquest of the Tropics.

The palm-thatched roof covered a closed-in room and an open one. A fireplace, a wooden pestle and mortar in which to hull the rice, a table of peeled poles, a little storehouse near by, and that was all.

I turned away from this primitive farm-yard with doubt that from such homes as this will ever come the human stuff which will master the tropics.

An approaching thunderstorm, with its banks of threatening clouds and claps of thunder, so characteristic of the summer season, hurried us back to the cayuco, and noiselessly we slipped downstream.

Graham had winged a Jacana, which dropped into the tall grass on the bank, and had just landed to get it when something so blue that it startled me flashed in an irregular course over my head and alighted somewhere behind a clump of trees on the edge of the swamp. I had never before seen a live morpho butterfly.

I had not realized that seeing one would be comparable to one's first sight of a ruby-throated humming-bird; but it is, and the excitement of that wholly unequal chase, handicapped as we were by the swamp, and our bitter disappointment at seeing the gorgeous thing, like a flash of blue sunlight, disappear into the forest, constituted one of the most vivid experiences of the whole trip.

THE BEAUTIES OF TABOGA ISLAND

Taboga was a great surprise. I was told that it was worth seeing; that it had a drier climate than Panama, and that delicious pineapples grew there; and Graham had been shown specimens of the gigantic bird-catching spiders which Dr. Zetek had said would jump at any one who disturbed them in their lairs beneath the rocks. But nobody prepared us for the peculiar beauty of this charming little island in the Pacific. The charm of it lies in its blending of Mediterranean architecture and tropical vegetation.

Here, clustered in a little valley surrounding an incomparable little beach, like the beaches of the Adriatic, was a century-old tile-roofed town with every line in it harmonious. I felt as if we had stumbled into a bit of old Spain.

The moon was just rising out of the sea when we landed, and our first glimpse was of the little plaza in the town. There were the youths and maidens, the evening social promenade, the sea, the soft Spanish voices, and the heavy perfume of the tuberoses in the borders. I thought of Funchal and Amalfi and of little villages on the Adriatic, but everywhere the palms and giant mangos and sapodillos broke the illusion and added an indescribable beauty to the scene.

But I cannot possibly condense into a few pages the impressions of a month in Panama. To my mind the Canal Zone is an oasis, spiritual as well as physical, in the very heart of the humid tropics. It is an oasis which has been built on a sufficiently large scale to show what can be done toward making a tract of land four times as large as the District of Columbia as safe a place to live in as the District itself, although surrounded on all sides by tropical jungle in which lurk all kinds of diseases which have for centuries devoured the white man whenever he has ventured into its shadows.

OUR COUNTRY'S ATTEMPT TO CONQUER THE TROPICS

So far as I have seen, this is the first time in history that a northern race has comprehended, and shown that it comprehended, the gigantic scale upon which it will be necessary to operate if the white races ever conquer the tropics.

Much has been said about the inability of the white race to live there. Perhaps it cannot live there as the brown and black races do; but, for all that, it can and will accomplish great changes; and the development of the Panama Canal Zone, with its sanitation, transportation facilities, its admirable hotels, and its stirring intellectual life, stands as a brilliant example of what the future may bring in the development of the gigantic resources of the tropics.

It is from this standpoint that I think one should view the accomplishments of our country and urge it to go on with the research work which it has begun, and make here, in this frontier post, the discoveries without which the scientific conquest of the tropics will be impossible.

We have greatly underestimated the problem of the tropics. It is one which should invite the greatest research talent which we have and be supported by our millions. The agriculturist who tackles

Photograph by David Fairchild

A FEW MINUTES AFTER SIX: MORNING SCENE AT TABOGA, PANAMA

With some of the character of a South Sea island, but with a century-old civilization, Taboga is the picturesque gem of this whole region, and at sunrise its coast has few rivals in tropical beauty.

the jungle single-handed and tries to farm within its shades is about as likely to succeed as would the man who tried to raise turkeys in a game preserve.

The parasites are legion; they attack every form of plant and animal, and most of them can only be seen through the tube of a microscope. It will constitute the life-work of hundreds of research men to find out their habits and how to circumvent them, and one of the best places in the world to do this could easily be the Canal Zone, were it only equipped with the special laboratories, insectaries, plant nurseries, trial gardens, and other paraphernalia of biological research.

If this work were to be handled on the same large and comprehensive scale that has characterized the engineering operations on the Zone, and not on the small unit "Experiment Station" basis, the world would be amazed at the results, just as it is today at the magnificent work of American engineers.

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AN OLD CATHEDRAL WHICH ONCE CONTAINED THE BONES OF A COLUMBUS: HAVANA, CUBA

When Haiti, the Island of the Twin Republics, was ceded to France, at the close of the eighteenth century, the bones of some one who was thought to be Christopher Columbus were transferred to Havana, where they remained for a time in this cathedral before they were taken to Spain, in 1898. It is now believed that only the bones of a kinsman of Columbus were taken back to the Old World, and that Santo Domingo is still the resting place of the great discoverer.

THE HAUNTS OF THE CARIBBEAN CORSAIRS

The West Indies a Geographic Background for the Most Adventurous Episodes in the History of the Western Hemisphere

By Nell Ray Clarke

SINCE the dawn of American history, the Caribbean, "that sapphire and emerald sea which creams to white" upon the sands of the magic islands that inclose it, from the eastern coast of Florida to the eastern shores of Venezuela, has been the scene of a romantic and cataclysmic life.

Beneath flaming tropical skies and heavy scudding clouds, earthquakes have tumbled parts of these palm-fringed islands into the hungry waters; volcanoes have spouted fire upon panic-stricken and powerless natives; great navigators and early geographers braved its hidden shoals and treacherous reefs, and buccaneers, hiding like wolves in their lairs among the countless excellent harbors which the islands afford, once were wont to spring upon the gold-laden Spanish galleons, carry off their booty to some lonely island retreat, and there divide the loot to be spent in riot and debauch in the cities of the Main.

Across the routes where once the wealth of the Incas was borne to Spain went American men and materials for one of the most stupendous engineering undertakings in the history of man—the Panama Canal.

STILL A REGION OF ROMANCE AND OF FANCY

Though the area is fast achieving a prominence which will not be servile to its former glory, romance and mystery have not forsaken the happy hunting ground of the sea rovers of the Spanish Main. Within recent months there have been reports that a phantom craft has been sighted somewhere along the North American coast, and the loss of some of our merchant vessels has been laid by the imaginative at the doors of men who are supposed to have developed a "pirate complex" as the result of six years of ruthless war at sea.

Columbus declared that the shores of the Caribbean were an earthly Paradise, "the most beautiful lands in the world, and very populous." In his letters he named the mainland Tierra Firme.

The sixteenth century privateers and pirates — fearless, erratic, adventurous spirits—though they turned this body of water into a veritable Spanish cockpit, at the same time discovered lands, developed the art of seamanship, and added greatly to the world's knowledge of natural history and geography.

Shortly after the discovery of America, Spain, at the height of her power, claimed all of this domain as her own, and trespassers were regarded as pirates. Though the richest half of Europe was then emptying gold into the coffers of Aragon and Castile, it is estimated that one-third of the imperial revenue came from Spanish colonies in the New World.

But Spain was not permitted to establish her sway in the Western Hemisphere unchallenged. Both England and France were puissant rivals.

With the English seamen of the sixteenth century, who were gentlemen adventurers swearing allegiance to Elizabeth, came French corsairs, Dutch zee-rovers, and nondescript bands of smugglers, slavers, traders, and privateers to infest the West Indies.

This motley crew was followed by the buccaneers in the seventeenth century and by ordinary pirates in the eighteenth.

As a consequence, there is scarcely an island among the hundreds in the Caribbean that has not its story of these early adventurers, and many bits of land reveal today definite marks of their handiwork. There is not a stretch of coast twenty miles in length which does not have its story of buried treasure. And to pique one's curiosity and arouse his enthusiasm, occasionally there drifts on shore in these regions a queer old coin, a doubloon or

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LOOKOUT TOWER ON THE OLD FORTIFICATIONS: HAVANA, CUBA

Captain John Davis, with his pirate vessels, cruised outside the well-fortified harbor of Havana before he set sail for the Florida coast, where he sacked St. Augustine in 1665.

moidore of Charles I or Philip II, a fragment of a chain, or a formless piece of bullion.

THE BUCCANEER WAS A PICTURESQUE FIGURE

The buccaneer was a picturesque fellow. His motto usually was, "A short life and a merry one." He seldom recognized allegiance to any country or crown, nor did family ties mean anything to him. He clothed himself in gorgeous finery when his purse was full, weighting down his ears with rings, his arms with bracelets, and his neck with chains, only to sell his jewelry and wear his apparel in tatters when his purse was lean, but always retaining in the days of adversity his gorgeous sash, as a sort of red badge of courage, and his villainous knife.

He was to be found wandering the streets of the semi-medieval Spanish towns of the New World, elbowing his way among swaggering soldiers, traders, Negroes, Indians, fair ladies, and assassins.

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A MARKET SCENE IN GUANTANAMO: CUBA

It is no unusual sight to see the peon women of Cuba puffing big black cigars. Frequently they stroll along the streets barefooted and smoking as nonchalantly as men.

There was practically no colony in the island-dotted Caribbean which had any scruples against allowing the buccaneers to build, fit out, or repair their vessels in its harbors. Tortuga, off the northern coast of Haiti, and Jamaica were veritable pirate strongholds, while Martinique, Curaçao, St. Kitts, and Barbados befriended them and encouraged their trade.

The home governments of France, England, and the Netherlands found it good policy to countenance the buccaneers and to wink at some of their activities. The Council of Jamaica even went so far in 1666 as to enumerate in its minutes twelve good reasons for granting commissions to privateers; for, this august body said, they furnished the island with necessary commodities at easy rates, bringing them coin, bullion, cocoa, logwood, indigo, and cochineal; helped poor planters by buying the provisions they had for sale; furnished work for various kinds of artisans; brought slaves to cultivate the plantations; furnished a navy for the island; and often, in intercepting Spanish messages, furnished the governor of the colony with valuable information.

The nursery of all the English and French colonies in the West Indies was St. Christopher, or St. Kitts, as it is now so often called, one of the Leeward Islands, half way between Porto Rico and Dominica. It was discovered by Columbus on his second voyage to America and called by him after the saint whose name the great discoverer himself bore (see illustration, page 179).

Though today almost every available inch of its deep and fertile soil is cultivated, St. Kitts is poverty-stricken, owing to overpopulation. Its seventy square miles are encircled by a good road, and the heart of the island is made up of a series of peaks broken by wild ridges and ravines, which culminate in a great quiescent volcano towering more than 4,000 feet above the sea, in whose crater there lies a peaceful lake.

A TOY TOWN HIDDEN IN THE CONE OF A VOLCANIC MOUNTAIN

Off the southeastern tip of St. Kitts lies Nevis, where Alexander Hamilton was born and where Horatio Nelson was married, and to the northwest of it lie the

Photograph from N. H. Darton

A CITY WHICH OWES ITS ORIGIN TO PONCE DE LEON: SAN JUAN, PORTO RICO

When this noted early explorer saw the well-drained peninsula and its nearly land-locked harbor, on the northern side of the island, he decided upon the site as a home for himself, and here he built his Casa Blanca, or White House, which still stands in its walled-in garden (see text, p. 173).

Photograph from Willard Price

A SHADE-TOBACCO PLANTATION IN PORTO RICO

Early explorers marveled when they first encountered natives with firebrands of the "weed" in their mouths. In 1920 Porto Rico exported nearly 225 million cigars, more than 5 million cigarettes, and 20 million pounds of leaf and scrap tobacco. The "shade" is of cheese-cloth, which not only protects the plant from the scorching rays of the sun, but also from insect pests.

Photograph by Herbert Turner

LITTLE SABA, WITH BOTTOM AT ITS TOP

This Dutch island is nothing more than a quiescent volcano protruding from the sea. A sailor once flippantly dubbed it "Napoleon's Cocked Hat," because of a fancied resemblance to the Emperor's headwear, and the geographical nickname has stuck to it.

Dutch-owned St. Eustatius and quaint little Saba. The latter, barely five miles in diameter, looks from the sea as if it were uninhabited; but tucked away inside the cone of its single volcanic mountain a seafaring people have built their toy town with white-walled and red-roofed houses, which, with a characteristic Dutch mental quirk, they have named Bottom. Up and down the sides of the mountain to the sea they are content to run several times a day, to engage in fishing, which furnishes them a livelihood (see illustration above).

The waters in the vicinity of the Virgin Islands, from the time of Sir Francis Drake, were frequented by sea-rovers of every class and description. Because of the numerous islands in the group, Columbus, when he saw them, on St. Ursula's day, named them after her eleven thousand virgins, and the "Virgins" has clung to them, a group name, though the sea-rovers rechristened numerous points in the cluster with names that irreligiously smack of pirate lore, such as Rum Island, Dead Man's Chest, Salt Water Money Rock, Flanagan's Pass, Dog Rock, Fallen Jerusalem, and Beef Island.

ST. THOMAS, RENDEZVOUS OF BLACKBEARD'S MEN

The Virgins lie less than fifty miles east of Porto Rico. The three principal islands, St. Thomas, St. John, and St. Croix, as well as many of the 100 or more lesser units of the group, are plainly visible from the deck of an approaching steamer (see illustrations, pp. 162, 174).

Life was turbulent in St. Thomas in the days when Edward Teach drove his lean pinnaces, filled with half-naked cutthroats—black, white, and yellow—into the pretty harbor at Charlotte Amalie (now officially known as St. Thomas), built his castle on one of its hills, and scoured the seas for the slow-moving, carved and gilded Spanish galleons, which were hauling the wealth of the Indies to the mother country. This adventurer even dared to anchor his pirate craft as far north as Charleston, South Carolina,

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THE OLDEST CHURCH IN PORTO RICO

The little town of San German, in which the ancient Dominican monastery stands, was founded in 1511. It is located in the western part of the island, where more than eighty years ago earthquakes were so continuous for a period of six months that it is said pots and pans refused to sit on the stoves. The inhabitants ate their food raw.

and to share his prizes with the Governor of North Carolina, his colleague, while he was still sentimental enough to marry, as his fourteenth wife, a charming creature of sixteen.

One of the chief points of interest in the picturesque little town of Charlotte Amalie, which has one of the best harbors to be found in Caribbean waters, is the castle of this redoubtable king of his kind, known in the sphere of his influence as Blackbeard. As a matter of fact, his queer "castle" looks more like an exotic species of windmill with its arms lopped off (see illustration, page 155).

Here, so the story goes, the mighty brigand fortified the excellent vantage point from which to spy out any vessel that ventured near his haven. On the opposite hill there is another fortress, which is called Bluebeard's, but the history of this pirate is sunk in oblivion.

Blackbeard's existence was, however, a vivid reality. He won his name because of a heavy black beard, about which he was exceedingly vain. It is said of him that he twisted this mane into small tails and tied them with ribbon and fastened lighted tapers under his hat to illumine his repulsive features and wild eyes, thus striking terror to the hearts of his victims.

The English colonies along the Atlantic seaboard being at the limit of their endurance, the Governor of Virginia offered a price for Teach's head. Lieutenant Maynard found him resting in Ocracoke Inlet, North Carolina, and there ensued a hand-to-hand encounter between the principals, which resembled Scott's description of the duel between James Fitz-James and Roderick Dhu. Finally the pirate dropped to the deck; his head was severed and attached to the bowsprit of Maynard's sloop and was carried triumphantly to Virginia.

ADMIRAL PILLSBURY'S NAME GIVEN TO "THE SOUND"

Between St. Thomas and St. John, hedged about by a chain of small islands that guard it from heavy seas and high winds, lies an excellent harbor, which

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BLUEBEARD'S CASTLE: CHARLOTTE AMALIE, ST. THOMAS

No one knows how this old tower gained its name, but active imaginations have woven fascinating stories about it. It was in reality built by the Danish Government during the latter part of the seventeenth century and remained the property of the king until about a century ago, when a private citizen obtained possession of it (see text, page 153).

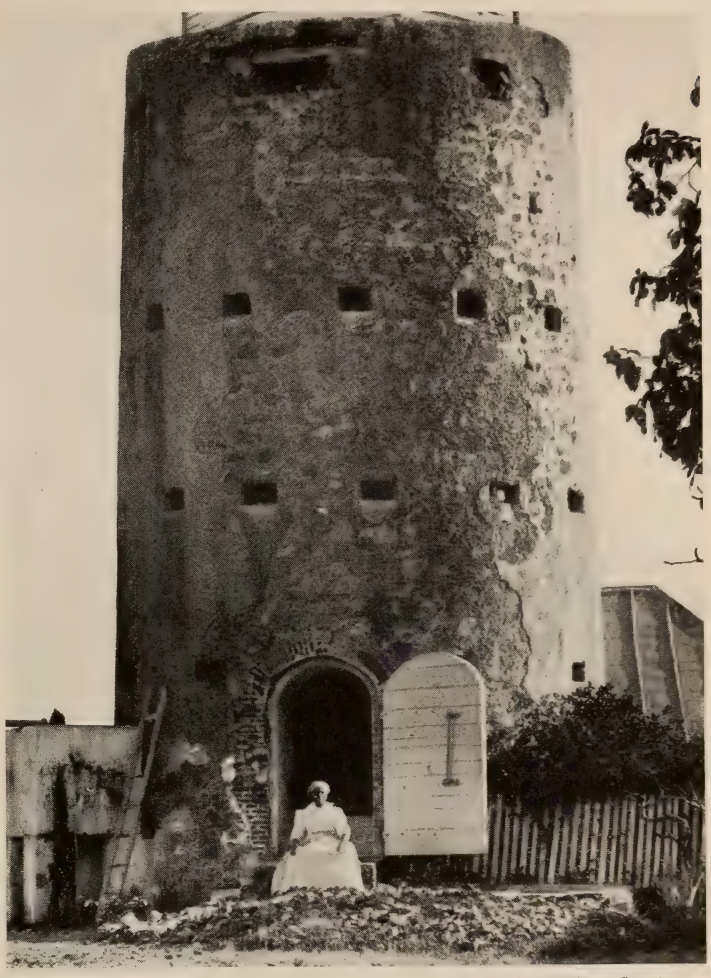
must have proved a satisfactory refuge for many of the old renegades. For centuries it was indefinitely dubbed The Sound; but a few months ago the United States Geographic Board, upon the recommendation of the United States Coast and Geodetic Survey, with the concurrence of the Navy Department, declared that it should henceforth be called Pillsbury Sound, in honor of Rear Admiral John E. Pillsbury, late President of the National Geographic Society, to whose scientific research relating to the laws that govern the movements of the Gulf Stream it is a modest tribute.

Pillsbury Sound is about two miles long from east to west and a mile and a half wide from north to south. It varies in depth from 8 to 16 fathoms and all the main passages leading into it are deeper than the sound itself. In its midst lie two small barren rocks, about 20 feet in

height, known as the Two Brothers. Within its curves a mighty fleet may safely ride at anchor.

Not all the Virgin Islands are named after the saints. There is Tortola, the Isle of the Turtle Dove, and Gorda, the "Fat Virgin," and Anegada, the Drowned Island, because it contains a vast lagoon known as Flamingo Pond, one of the few places where this bird of such gorgeous plumage is to be found south of the Bahamas.

Anegada is skirted on its northern shores by a narrow band of coral, known as Horseshoe Reef, making the approach to the island one of the most dangerous along the whole Atlantic. Countless proud hulls have been crushed on its jagged edge. It was this island that put an end to the pirating of Prince Rupert of the Rhine, who left Ireland in 1648 to fight for the English king in the colonies, and that sheltered Sir Francis Drake in the bay named in his honor, when he was on the lookout for the galleons of Spain.



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BLACKBEARD'S CASTLE, ON THE CENTRAL HILL ABOVE CHARLOTTE AMALIE: ST. THOMAS

Though legend tells us that here the famous Blackbeard lay in security, ready to pounce upon any ship that ventured near the harbor, the fort was probably built by the government, as was "Bluebeard's Castle," shown on the opposite page.

TORTUGA, WHERE PIRATES MADE THEIR HOME

No place can claim a fuller measure of pirate lore than Tortuga, a small island located opposite Port de Paix, off the northern coast of Haiti. It is heavily wooded, rugged, and sparsely inhabited, and for those who are ignorant of its past there is nothing about it to arouse curiosity; but to those who know its history it is an enchanted isle, for it is alleged to contain more buried treasure than any other spot in the Antilles. For thirty years after the buccaneers were driven from St. Kitts it was such a stronghold for the "brethren of the sea" that even the mighty King of Spain, with all his ships and men, could not break it up.

Esquemeling, that delightful old pirate who turned into literature the doings of the sea wolves with whom he was associated and those about whom he naturally had heard so much, tells us that the Spanish named the island Tortuga because in shape it resembles a sea-tortoise,

called by them *tortuga de mar,* a reptile which was an important article of food for these early rovers of the sea and was plentiful on the island.

In its prime, when it was the headquarters of the buccaneers, this sink of the West Indies was spoken of as "the common refuge of all sort of wickedness and the seminary, as it were, of pirates and thieves," though it was admitted that the outlaws themselves lived together in orderly fashion, without bolts or bars on their doors.

The reason for the choice of Tortuga as a resort lay in the fact that its harbor was easily defended, and that it gave easy access to the Mona and Windward Passages, the usual routes followed by the ships of Spain in their voyages to and from Cartagena, Porto Bello, and Vera Cruz.

Here the freebooter had a home; on the beach he careened his ships and divided his pieces-of-eight, and in the town of Cayona he set up such Lares and Penates as he had, rested from his labors, and cursed or swaggered over his luck. In the later days of piracy it became the seat of operations of the French corsairs, the English repairing to Jamaica.

HOW PETER WON HIS PLACE IN THE PIRATES' "WHO'S WHO"

Perhaps no one has ever left his mark so indelibly upon any place as did the French pirate, known as Peter the Great, upon Tortuga. Before the time when this celebrity by a single act won a kingly nickname, amassed a fortune, manufactured a halo for himself, became a shining example to his fellow-men, and then wisely retired from business, the little island was a self-respecting community of humble, honest, and peaceful planters.

The exploit which placed Peter in the "Who's Who" of piracy was his encounter with the vice-admiral of the Spanish fleet. The engagement occurred while the latter was sailing majestically through the Bahama Channel. Peter overhauled the Spaniard, clambered with his men over her sides, scuttled his own boat to make him and his horde fight with more devil-may-care recklessness, and mastered the prize.

Peter then took his gorgeous new vessel home to France, where he lived in respectability for the rest of his days. But the effect of his prosperity on the inhabitants of Tortuga was instantaneous. There was a mad scramble for boats, and they thenceforth became scavengers of the sea.

HOW THE BUCCANEERS GOT THEIR NAME

It was in Tortuga that the men who thought it their right to prey upon the commerce of Spain acquired the name of buccaneers. One of the chief reasons for the choice of Tortuga as a pirate colony was its nearness to Haiti and the *bucans,* where they could obtain their meat supply. When Santo Domingo was settled by the Spaniards they found that it produced no cattle, the only quadrupeds of any size being wild pigs; so black cattle were imported. The herd increased with a rapidity almost beyond belief and ran wild over the island.

The men of Haiti and Santo Domingo hunted these cattle for food, shooting them with muskets four and a half feet long. The meat was cut into strips and hung on frames over slow fires to smoke.

The Indians, who taught the settlers the process, called both the place where the curing was done and the dried meat itself *bucan,* and as the cattle-hunters usually presented a bloody and forbidding appearance, they were termed buccaneers.

The exposed geographic position of the island of Haiti, which gives one the impression, from any direction it is approached, that here an enormous and heterogeneous mass of mountains was cast into the sea, made it a convenient stopping place and battleground for almost everything that drifted across the seas. Columbus found it; Ponce de Leon became lieutenant to its governor, acquired fame on it for himself as a successful slayer of Indians, and used it as a base of operations for explorations in Porto Rico and elsewhere. Seldom has it seen days of peace.

In the latter half of the seventeenth century Jamaica was the stronghold of the English buccaneers. Morgan, the greatest and most sagacious of the pirates, planned most of his expeditions in Port Royal, which had the reputation of being the richest and wickedest spot on the earth. And proud the city was of its notoriety. Defiant, flamboyant, and un-

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AN AVENUE OF ROYAL PALMS AT BRIDGETOWN: BARBADOS

So dense is the population of this 166 square miles of the British Empire set down in the West Indies that it is hard to tell where one town ends and another begins. The little island, due to its delightful climate, has long been known as a health resort.

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ONE OF THE MANY WINDMILLS ON THE SUGAR PLANTATIONS OF BARBADOS

Barbados has well earned the sobriquet of "Little England," by its loyalty and its persistence in maintaining the traditions of the mother country. A "Badian born and bred" seldom leaves the "tight little, right little, island." The cultivation of sugar-cane was introduced on the island about the middle of the 17th century and, owing to the cheapness of labor and the fertility of the soil, proved highly profitable from the beginning.

Photograph by Herbert B. Turner

LOOKING SEAWARD FROM A POINT NEAR THE VILLAGE OF BATHSHEBA: BARBADOS

Bathsheba is considered the spot *par excellence* for healthful sea breezes in Barbados. The shore-line, which at this point curves about a beautiful bay, is noted for its mushroom- and haystack-shaped rocks.

Photograph by Herbert R. Turner

THE BUSY HARBOR AT BRIDGETOWN : BARBADOS

Bridgetown is one of the busiest ports of the British West Indies, its export and import trade each amounting to more than fifteen million dollars annually, the major portion being with the United States and Canada.

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NOT A MUSICAL COMEDY CHORUS, BUT A GUARD IN FRONT OF THE MILITARY BARRACKS AT KINGSTON, JAMAICA

From the barracks, which are at an elevation of 3,900 feet, one can see more than a hundred miles of Jamaica's coast-line, as well as the city of Kingston and its harbor, Port Royal, and the Palisadoes, where Sir Henry Morgan, reformed pirate, lies buried.

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A PANORAMA OF THE HARBOR OF CHARLOTTE AMALIE, CHIEF SEAPORT OF THE VIRGIN ISLANDS

Nearly all the inhabitants of the island of St. Thomas are clustered in the town of Charlotte Amalie, which is built on the four hills encircling the metropolis of the most recently acquired insular possessions of the United States.

Photograph from Clarence E. Ferguson

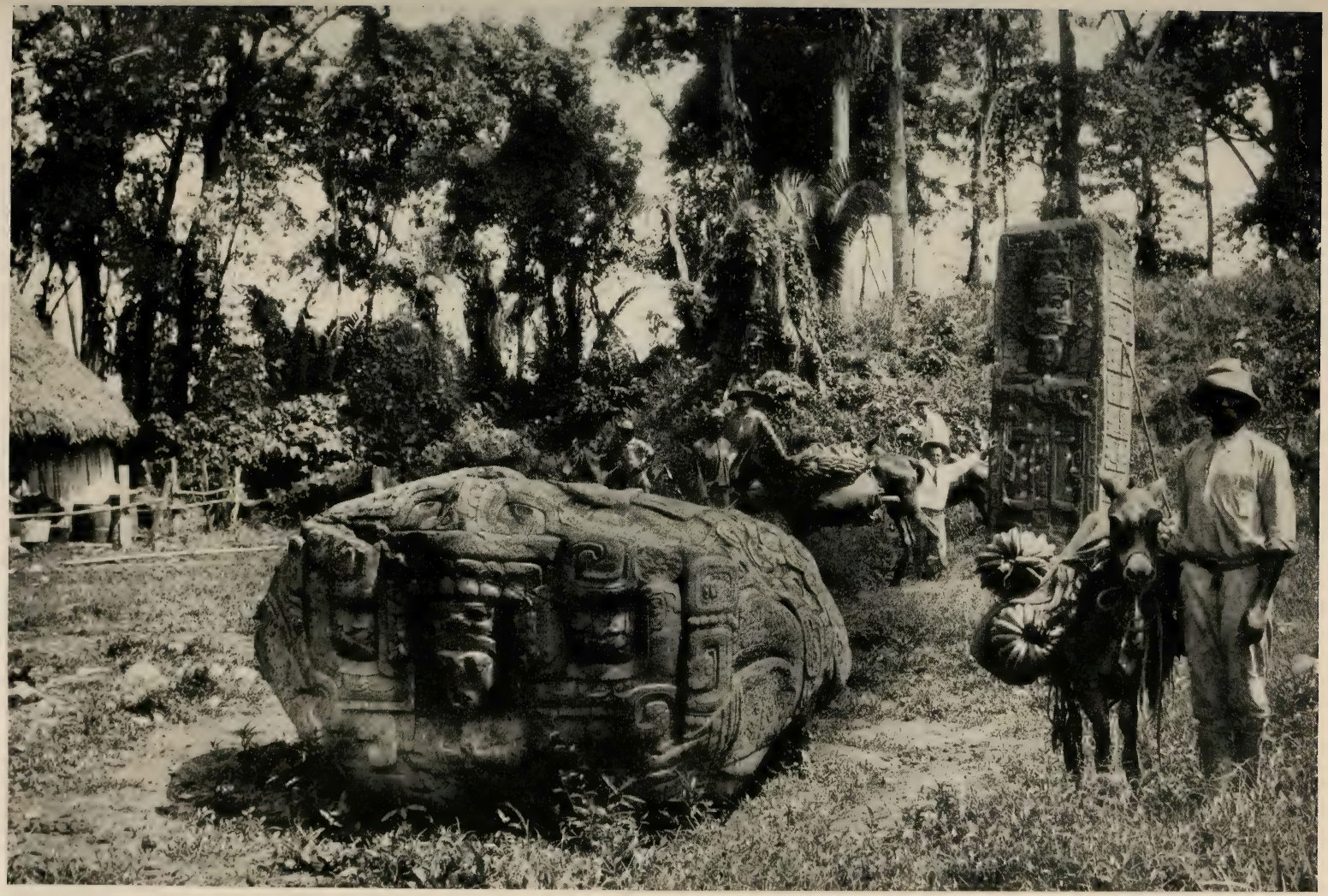
ONE OF THE FIRST FORTIFICATIONS IN THE NEW WORLD: MORRO CASTLE, SAN JUAN, PORTO RICO

San Juan is today one of the most perfect specimens of the walled town, with battlements, a moat, and portcullis. Morro Castle, which was completed in 1584, though it was begun much earlier, has within its walls a chapel, warehouses, officers' quarters, barracks, a bakery, and dungeons under the sea.

Photograph from O. Gaylord Marsh

THE CASTILLO OR PRINCIPAL TEMPLE AT THE RUINS OF CHICHEN ITZA, YUCATAN, MEXICO

This splendid temple surmounts a pyramid 85 feet high, composed of 9 paneled terraces or platforms. Stairways lead up all four of the sides, but only that on the front, or north side, has serpent balustrades. These are made in the likeness of the feathered serpent, Kukulcan, the Culture Hero of the city. The head is at the bottom of the stairway, the body forms the balustrade, and the tail, represented with rattles, is the newel-post on the summit above. The ceremonies to the rain deities, which culminated so tragically and so gruesomely at the brink of the Cenote of Sacrifice (see page 114), were probably begun in this temple by the priests incensing the maidens chosen for sacrifice.



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TWO OF THE FOURTEEN GREAT STONE MONUMENTS AT THE RUINS OF QUIRIGUA, GUATEMALA

The ruins of Quirigua are located on a banana plantation in the Department of Izabal, Guatemala. This city flourished from 472 to 551 A. D. and was probably founded as a colony from Copan, the great southern Maya metropolis, 35 miles to the southeast. The two monuments shown above are Zoömorph B (left foreground) and Stela A (right background). They were erected to commemorate the ends of successive 5-year periods, the latter dating from 516 A. D. and the former from 521 A. D.

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THE SHADY LANE LEADING TO ST. JAMES POLICE BARRACKS, PORT OF SPAIN : TRINIDAD

The trees in Trinidad are giants of great luxuriance, variety, and beauty, many of them of primeval growth. They furnish some of the principal dyes and cabinet woods known to commerce.

© Publishers' Photo Service

OPENING COCOA PODS: TRINIDAD

The men usually slash open the pods with large knives and scoop out the contents—a sticky white pulp containing about forty beans arranged in rows. The women and boys with their hands break the beans out of the pulp.

© Publishers' Photo Service

A BAMBOO TREE ALONG THE ROADSIDE IN TRINIDAD

Trinidad presents a fascinating field for the naturalist. One historian says of it: "We have lakes of pitch, streams of tar, oysters growing on trees, an animal resembling a fish that produces its young alive, crabs that climb and feed in fruit trees, another fish that entertains us with a concert, and one kind that is clad in a complete suit of armor."

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A STATUESQUE VENUS OF MARTINIQUE

The race of Martinique—a mixture of Carib Indian, French, and Negro—varying through all the shades of yellow and brown, is a remarkable one. The men are finely formed and lithe in their movements and the women exceedingly comely.

© Publishers' Photo Service

THE EVIL GENIUS OF MARTINIQUE: MONT PELÉE

Gloomy and sinister, the mountain towers above Fort de France, the capital of the island and the chief city since the complete destruction of St. Pierre by volcanic eruption on May 8, 1902 (see "The National Geographic Society's Expedition to Martinique and St. Vincent," in THE GEOGRAPHIC for June, 1902).

© Publishers' Photo Service

THE STATUE OF MARTINIQUE'S MOST FAMOUS WOMAN, NAPOLEON'S JOSEPHINE

Always the proud Empress, but in certain lights a bit wistful, she stands in Fort de France, facing Trois Ilets, where her youthful days were spent. The estate on which she lived, together with the church where she was baptized, are today the principal points of interest in connection with the life of this famous woman in Martinique.

Photograph by American Photo Company

MORRO CASTLE AND THE MOUTH OF HAVANA HARBOR, FROM THE BANDSTAND AT THE FOOT OF THE PRADO

There are few such picturesque harbor entrances in the world as that of Havana. The tongue of land on which Morro Castle is situated is extremely narrow, and whether the castle is viewed from the Prado, the Malecón, or from the sea, it is a picture at once grim and beautiful. The Prado is a broad avenue with beautiful center parking and lined by splendid residences and aristocratic clubs, interspersed with cheap fruit stands and small stores. The Malecón is the magnificent seawall driveway built during the American occupation.

abashed, it greeted the chiefs who lent riotous color to its life, emptied gold into its coffers, and tinged its nights with drunkenness and depravity.

EARTHQUAKE CASTS PORT ROYAL PIRATES INTO THE SEA

In those days Port Royal had a high wall about it and wide quays, whereon its habitués emptied their pieces-of-eight. Then, as if Providence were outraged by its utter disregard of moral laws, an earthquake, on June 7, 1692, shook Jamaica to its foundations and tumbled this den of iniquity, with scores of the pirates, into the sea. When the water is calm the coral-encrusted ruins of the old town may be seen beneath the water, even today, and the natives still regale the visitor with stories of phantom ships that are trying to make the port.

One interesting relic remains, however, in Fort Charles, a stiff old veteran of sun-faded bricks. Some of the officers' quarters and a paved court, so white that it dazzles, are still standing. Flower gardens now encircle its walls; its gun embrasures are hidden by bushes; the birds haunt its crannies, and the lizards crawl lazily over its parapets. Horatio Nelson was stationed at the fort in 1779, when he was twenty-one years of age, and the paved platform which was known affectionately as his "quarter-deck" may still be seen.

The town now standing on the old site is respectable, faded, and disconsolate. On the fences and bushes, in melancholy ugliness, the commonplace inhabitants dry the fishing nets by means of which they eke out their existence.

The pirates, with these two bases, Tortuga and Port Royal, for operations, took toll of all the islands and lands along the Caribbean.

Across the magnificent harbor from Port Royal lies Kingston, the capital of Jamaica and one of the most important ports in the West Indies. Its foundations were laid by Port Royal survivors.

Though only 2 per cent of Kingston's 50,000 people are white, no small body of citizens of any city has shown more courage, energy, and determination during the hurricanes and earthquakes which have time and again literally destroyed its very foundations. Hardly had its charred ruins cooled after the violent earthquake and fire in 1907 before the survivors were busy building, between the palm-fringed shore and the blue hills beyond, a clean, regularly laid-out town to take the place of the one which Nature had just destroyed (see pp. 161, 180-183).

Havana, which rose to importance as a convenient port of call for ships passing through the Florida Straits bound for Mexico, was frequenlty attacked and looted. Santiago's harbor, that magnificent "bottle" with a neck of less than 600 feet, sheltered pirate ships while their owners tortured the city's inhabitants and extorted enormous sums from them. Baracoa, Cienfuegos, and Trinidad, the last named one of the earliest fortified cities in the New World, were the scenes of desperate combats.

Just 23 years after its discovery, pirates began to harass Porto Rico, where Ponce de Leon, impressed by its rugged scenic beauty, had built at San Juan his Casa Blanca, which, together with the old cathedral in which his bones are buried, may be seen today. French privateers shortly afterward sacked the town of San German, and the Carib Indians ate the governor (see illustration, page 153).

Though American rule has placed its indelible stamp upon Porto Rico, the pretty city of San Juan is still Spanish in appearance. The low, flat-roofed houses, prodigal of sun-shuttered balconies, and lazy courtyards filled with shifting shadows, are packed together within its great black wall. Much-painted churches and dazzling government buildings border streets where blasé oxen and dust-covered mules jostle the electric cars, and over it all there broods a leisurely atmosphere (see illustration, page 163).

There are some 340 miles of railway and 1,100 miles of excellent roadway in Porto Rico, which has about three times the area of Rhode Island.

THE WEALTH OF THE NEW WORLD WAS SHIPPED FROM CARTAGENA

The destination of most of the ships which sailed from Spain to America was Cartagena, a town on the northern coast of Colombia. Its massive stone walls survive to speak of their strength in the early days. The wealth of the western coast of South America was gathered

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AMERICAN TOURISTS LANDING AT ST. THOMAS: VIRGIN ISLANDS

On account of the natural features of this island, which if fortified would render it practically impregnable, it has been aptly called the Gibraltar of America.

Photograph by Herbert Turner

A BIT OF BARBADOS BEACH FRINGED WITH PALM AND FOAMING SURF

Such a shore-line the buccaneers sighted on practically all the coasts skirting the Caribbean from southern Florida to Trinidad, off the northeastern coast of Venezuela. Animal-Flower Cave, a remarkable cavern, has been hollowed out by the waves driven by the trade winds, which blow along the northern shores of the island.

Photograph by Herbert Turner

A LONG TRAIL A-WINDING THROUGH THE ISLAND OF BARBADOS

There are 470 miles of excellent roadway traversing this island. George Washington visited Barbados in November, 1751, upon his only voyage into a "foreign" country.

first at Panama, then hauled by mules across the Isthmus and deposited at Porto Bello, near the mouth of the Cascajal River, until it could be shipped to Cartagena; thence it was taken out, through the Caribbean Sea, across to the Azores and home.

When the Spanish fleet, usually consisting of from five to eight war-vessels, several smaller boats, and numbers of merchantmen, put in its appearance at Cartagena, about two months after leaving Cadiz, word was immediately forwarded to Porto Bello, then over the Isthmus, and down the Pacific coast to the viceroy at Lima.

The governor of Panama also passed the word along to the inhabitants of Granada, which lay farther north, in the Central American region, and to the merchants along the Guatemalan and Nicaraguan coasts who might be interested.

Soon there was gathered in Old Panama the riches of the Incas—silver bullion, silver plate, and precious stones—gold from the mines at Cana, the richest in America at that time, and pearls from the Pearl Islands in the Gulf of Panama, just to the west of the Gulf of San Miguel. Into this body of water Vasco Nuñez de Balboa waded shortly after he had seen the mighty Pacific from the top of Mount Pirre, and, in the name of his sovereign, Ferdinand of Spain, claimed the South Sea and all the lands bordering it, from Pole to Pole, until the Day of Judgment.

Despite the fact that Porto Bello has one of the best harbors on the Caribbean west of Cartagena, it plays an inconspicuous rôle today, due in some measure to the fact that it is exceedingly unhealthful. This condition, however, though hundreds of men succumbed yearly, did not serve to diminish its importance in early days.

The ancient city, the real entrepôt to the Isthmus, was situated at the head of the horseshoe-shaped Porto Bello Bay. In its prime it is said to have boasted 130 houses,

a hospital, governor's house, churches and convents. Merchants, soldiers, and seamen crowded into the huts occupied by mulattoes until houses could be built for them; but so far had the desire for economic justice developed among them that prices were fixed for most commodities and lists published beforehand, to insure the inhabitants against profiteering.

The old town was alive with business men when the famous Porto Bello fairs were in full swing, and merchants spent as much as a thousand crowns for a small shop to house their commodities during the forty-day period.

© Publishers' Photo Service

MODERN "PIRATES" OF BARBADOS WAITING FOR THE PENNIES OF THE PASSENGERS ON A LINER

The Barbadian negro is noted for his large, round head, his pleasant features, and his open countenance. He is polite and well-mannered, in contrast to his less genial Jamaican brother.

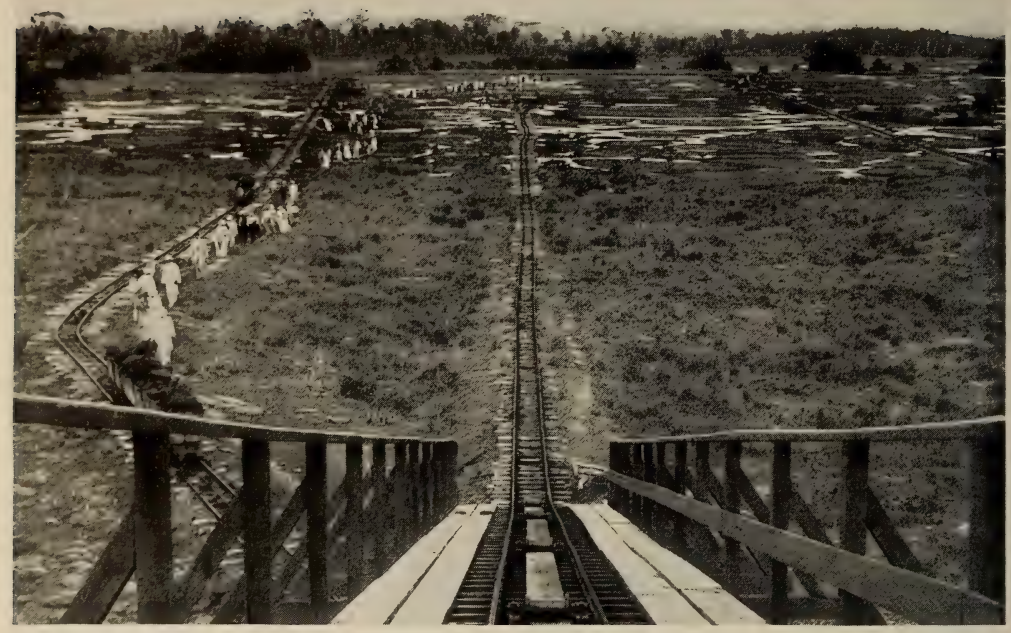
DESOLATE OLD PANAMA ONCE CHIEF CITY OF THE AMERICAS

But Old Panama, founded in 1518, was the metropolis of the Isthmus then as New Panama is today. It was probably the richest place in all America, since it was the market for the whole of the west coast, as well as for the spices and silks of the Orient, and it kept in touch with the towns along the east coast through the Chagres River.

Though the site of Spain's great power in America is today an utter ruin, with only a few evidences of former habitation, the tower of the old Cathedral of San Geronimo, standing out above the jungle, may be seen from the walls of the new city. Built on a rectangular point of land, where it was naturally protected on three sides by rocky bluffs and on the land side by a morass, it was able to hold its own against all enemy expeditions until it was destroyed, in 1671, by Henry Morgan. Panama City was founded a few miles farther west (see page 187).

Where desolate ruins are now, once there flourished a city reputed to have had a population of 30,000. Its two hundred houses of European elegance and five thousand of the common kind, its mint, its hospital, its hundreds of warehouses, its cathedral, its eight convents and the king's stable, made it the equal or the superior of anything to be found on the two continents. Portions of the old Gold Road, along which the tiny bells of the heavily laden mules used to tinkle, can still be followed for miles toward Porto Bello, though in many places it becomes an almost unrecognizable trail through the forest. (See map supplement.) It was in this arena that Morgan played so staggering a part (see pages 184-186).

No story is complete without the development of its villain, and such a part in the history of Panama is the one



THE GREATEST ASPHALT PRODUCER IN THE WORLD—PITCH LAKE, TRINIDAD

The pirates often sought the shores of Trinidad to calk their boats with the pitch which was here so plentiful. Along Caribbean coasts it is reported that formerly quantities of the substance melted in the sun and then congealed in great heaps, resembling small islands.

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A CARIBBEAN CONTRIBUTION TO THE STREETS AND HIGHWAYS OF THE UNITED STATES

The remarkable Pitch Lake of Trinidad furnishes a million dollars in revenue for its people each year. Columbus noted "that abundance of stone pitch that all the ships of the world might be therewith laden from thence." He found it excellent in trimming his vessels.

© Ewing Galloway

BRAINLESS HEADWORK AT ST. LUCIA: WINDWARD ISLANDS

It is customary in many of the islands of the West Indies for women, each carrying from 75 to 90 pounds of coal on her head at one time, to fill the bunkers of the vessels which stop at their ports.

Photograph by Herbert Turner

THE TOWN SQUARE IN BASSETERRE, THE CAPITAL OF ST. KITTS

The clock-tower in the center of the square was erected to the memory of the Hon. T. B. Berkeley, a prominent citizen of the colony. The lower parts of the houses in St. Kitts are built of a grayish stone, the upper stories being of wood.

Photograph by Frederick Monsen

WRECK OF THE "VICTORIA LOUISE," NEAR KINGSTON: JAMAICA

In olden days into this very harbor at Kingston, which is ten miles long and two miles broad, the pirates' pinnaces poked their lean noses and rested in peace from their fighting. Jutting out from the mainland, just as the harbor is approached, is Gallows Point, where it is said the last of the pirates who haunted Cuba and Jamaica were executed.

Photograph by A. Duperly and Son

TRAVELING A LA MODE IN JAMAICA

The name Jamaica is derived from a native word which means the "Island of Fountains." An English fleet conquered its three thousand Spaniards and natives in 1665, and since that time it has been a part of the British Empire. Sir Henry Morgan was its governor after he renounced the profession of piracy (see text, page 187).

Photograph by A. Duperly and Son

THREE TYPES OF BURDEN-BEARERS IN JAMAICA

The story of the natives of Jamaica is that of many of the other islands in the West Indies. The Indians dwindled away under Spanish rule and the African Negro was imported as a laborer, with the result that he is the predominant race in the island today.

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A SILK COTTON, OR CEIBA, TREE: JAMAICA

The native of Jamaica will not voluntarily cut or injure trees of this species, because they are believed to be inhabited by "duppies," or spirits. If compelled to fell a tree, he chants during the operation, "Me no cut you, massa; he cut you."

© Publishers' Photo Service

GOING TO MARKET IN JAMAICA

In the old days Jamaica rum, then the most important product of the island, furnished the inspiration for the buccaneers and boosted their courage (see text, page 156). Today the raising of fruit, sugar, and coffee are the principal industries. Jamaica's Blue Mountain coffee brings, perhaps, the highest price of any in the world.

played by the wily Sir Henry Morgan, whose cruelties and inhumanities are usually whitewashed because of the glamor of his achievements.

THE DRAMATIC STORY OF A KIDNAPPED YOUTH

This lad of Wales, born of good parentage, was kidnapped in Bristol and shipped to Barbados to be sold as a bondsman. When he had served his time he sailed for Jamaica, where he joined the buccaneers, and his ability as a leader was immediately recognized.

The old and distinguished pirate admiral, Mansvelt, chose Morgan as his vice-admiral, in which capacity he served until the former's death, which left him at the head of the profession. His popularity as a leader and his reputation for boldness made it easy for him to collect about him hundreds of men and a large squadron of vessels; and from this time until his retirement his exploits read like

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MOTHER'S LITTLE HELPERS SHELLING THE BEANS FOR DINNER IN A HUMBLE COLOMBIAN HOME

It is said that nowhere, not even in Japan, is more kindness shown to children than in the South American home. In fact, the child cult has a place of great importance in the social and civic life of Latin American nations.

the fascinating stories of some crafty magician who picks up gold and jewels from unsuspected places and whose machinations never fail.

In 1670, after a series of successes, he was able to collect more than 2,000 fighting men and 37 vessels at Tortuga by simply letting it be known that he intended invading some stronghold on the mainland. Provisions for the journey having been captured and taken on board, the vice-admirals and captains met to decide which of the three ports—Cartagena, Panama, or Vera Cruz—should be the objective.

By almost unanimous decision, Panama was chosen, as it was believed to be the richest. They set sail for Santa Catalina (Old Providence), off the coast of Costa Rica, the convict station for outlaws from Panama, in order to secure suitable guides for the journey. Having con-

Photograph by Russell Hastings Millward

LITTLE BOYS AND GIRLS MUST LEARN THEIR A, B, C'S IN BRITISH HONDURAS, TOO

The early settlers of British Honduras were woodsmen and cattle-hunters, and today this crown colony of Great Britain is still noted for its mahogany and logwood.

Photograph from United Fruit Company

THE BRIDGE CROSSED BY MORGAN ON HIS WAY TO SACK OLD PANAMA IN 1671

The visitor to the ruins often crosses over this archway, which every night whispers to the waters of the famed South Sea that ebb and flow beneath it of the days when mules carrying the wealth of an empire passed over it (see text, pages 176 and 177).

Photograph from Geo. R. King

THE "FLAT ARCH" AT THE ENTRANCE TO THE RUINED CHURCH OF SAN DOMINGO: PANAMA CITY

When the arch over the entrance to the church was being built by Dominican monks, it fell three times. Then, according to legend, one of the monks had a dream in which a plan for a new arch was revealed to him, and when the one now standing was erected according to his dream it stood firm. The unique feature is that it is almost flat.

quered by stratagem this island, with its nine fortresses, Morgan sent a body of men to take the castle at Chagres, which would leave the way to Panama clear.

The castle, which was one of the most nearly impregnable fortresses of its time, lay at the mouth of the Chagres River, a few miles southwest of Colon Harbor. This the pirates took, by a very remarkable accident, after fierce fighting and the failure of many assaults. Esquemeling tells us that one of the pirates, wounded by an arrow that pierced his body from side to side, coolly pulled out the weapon, wrapped the end of it with cotton, stuck it in his musket, and fired it back at the castle. The cotton was kindled by the powder and, falling upon a thatched roof within the castle, set that building and numerous others on fire. The conflagration finally reached the powder magazine, which exploded, causing such consternation among the Spaniards that the garrison surrendered.

After a long and tiresome march across the Isthmus, the pirates at last reached Panama, which had been warned by the fall of Chagres and was ready for their coming. After almost twelve hours of continuous fighting, the proud Spanish capital fell into the hands of the pirates, who reduced it to ashes after seizing all the wealth which the inhabitants had not been able to send out to sea in one of their galleons.

MORGAN HELPS TO SUPPRESS PIRACY

Morgan was evidently wily enough to appropriate most of the booty for his own uses, and, fearing for his safety because

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RUINS OF THE CATHEDRAL OF SAN GERONIMO AT OLD PANAMA

This old tower constitutes practically all that the pirates under Sir Henry Morgan left of the city which was once the pride of Spain in America (see text, page 177).

of the dissatisfaction among his men, he slipped away in the night to Jamaica with only a small contingent of his fleet. The governor received him with open arms, probably not daring to do anything else. Later they were both called to England to give an account of their doings; but Morgan was able to ingratiate himself with the king, who knighted him and sent him back to Jamaica as lieutenant-governor of the island because of his "long experience with that colony."

It is said of the reformed pirate that he proved a good executive and was instrumental in curbing further piratical operations in the West Indies, and on the theory that "it takes a thief to catch a thief," perhaps the English king's appointment was a wise one.

At any rate, Morgan's rule in Jamaica marks the end of the heyday of piracy in the Western World, and thenceforth Caribbean lands, if not entering upon such an era of happiness as is distinguished by "no history," lost for a time the glamor of romance and adventure.

Photograph from Harriet Chalmers Adams

DRYING AND SACKING COFFEE ON A SALVADORIAN PLANTATION

Coffee, the leading agricultural crop, forms over three-fourths of the total exports of the country. Other products are sugar-cane, indigo, cacao (cocoa), rubber, balsam, tobacco, and rice.

VOLCANO-GIRDED SALVADOR

A Prosperous Central American State with the Densest Rural Population in the Western World

By Harriet Chalmers Adams

Author of "Kaleidoscopic La Paz," "Cuzco, America's Ancient Mecca," "In French Lorraine," "Rio de Janeiro, in the Land of Lure," etc., in the National Geographic Magazine

SANTA CLAUS is not the only myth. *Cayenne* pepper does not come from Cayenne. *Panama* hats come from Peru and Ecuador; *Peruvian* balsam comes from Salvador.

El Salvador, as the people themselves call their volcano-girded, forest-fringed country, lies on the west coast of Central America, a week's sail by coastwise steamer, north from Panama.

The only country between Canada and Colombia without an Atlantic as well as a Pacific seaboard, Salvador was, until recently, the smallest of the American republics; now, with Honduras and Guatemala, it forms the new Republic of Central America. It has the densest rural population on the mainland of the Americas, with 1,400,000 people occupying an area no larger than the State of New Jersey.

Coasting Central America, I wakened one morning to see, through my cabin window, a line of majestic peaks against a rose-tinged sky. In the foreground, its outline nearly lost among the higher purple mountains, rose the volcano Izalco. Even as I looked, a cloud of smoke shot from its summit, and down the shadowy slopes swept a river of flame with radiating tongues of fire.

Seafaring men called Izalco "The Lighthouse of Salvador." To the Salvadorians this active volcano was known formerly as "The Safety Valve." They believed that its daily eruption assured their deliverance from severe earthquake and devastating lava flow. Then came the fateful day when Izalco ceased erupting, followed by those terrible earthquakes which in part demolished the capital, while another, heretofore dormant, volcano in a densely populated district rocketed forth a living stream of fire, which completely destroyed towns and *fincas* (estates), and for miles around covered that season's coffee crop with a fine lava dust.

On my first visit to Salvador we disembarked at Acajutla, an open roadstead, the ship's anchorage being a mile out at sea. Through the heavy swell we went ashore in a launch, being hoisted onto the pier in a swinging, crane-operated basket (see page 190). The lift was cleverly executed. just as the swell passed under the launch.

We boarded the train for the interior and an hour later left the railroad for the saddle, accompanying our Salvadorian host to his finca, which lies among the hills of the balsam coast, 2,000 feet above sea-level. The house of the estate is set in a magnificent forest of giant balsam-trees, whose trunks bear scars made by a pre-Columbian people, who tapped them then for the scented balm in much the same method employed today.

How Salvador's Balsam Received Its Peruvian Name

In order to avoid the perilous passage around Cape Horn, cargoes, in Colonial days, were unloaded at Panama and transported across the Isthmus for shipment in other vessels to Spain. Peru was then the best known of the New World lands, and, in the European mind, Central American balsam, which came quickly into favor for the healing of wounds, somehow became confused with Peruvian bark, another newly discovered remedy; hence to this day it is known as Peruvian balsam.

The balsam-tree, one of the most beautiful of the tropical forest, is cousin to the acacia. It grows rather isolated from its neighbors, even from its kind, its graceful branches high above the ground. Native to the west coast of Central America, it has been exploited only in Salvador, where it grows in a limited

Photograph from Harriet Chalmers Adams

A TRAVELER BEING HOISTED ONTO THE PIER AT ACAJUTLA

From the ship's anchorage, a mile out at sea, the traveler comes to shore in a launch and is hoisted onto the pier by means of a crane-operated chair or basket. Sometimes the surf is rough and wind sways the chair. Then the traveler breathes a sigh of relief as he steps ashore.

area of 750 square miles. It has of late years been introduced into Ceylon.

I watched the balsam tappers at work. Their method is primitive. Although the tree holds sap all year round, the tapping takes place only in the dry season. The outer bark is first cut with a blunt instrument, leaving the inner bark exposed, the flow of sap being stimulated by the application of a burning torch.

After several days the sap exudes slowly, but steadily. Cloths attached to the wounds, having become impregnated with the balm, are collected, thrown into boiling water, and subjected to heavy pressure. The crude balsam settles at the bottom and the water is then poured off.

The balsam, later clarified through the evaporation of impurities, is packed in metal cases for shipment to Europe and America, where it is used for medicinal purposes and as a basis for perfume. Every morning at the finca a servant walked through the house waving a burning balsam branch. We lived in an atmosphere deliciously perfumed.

TO A BRAZILIAN SCHOOL TEACHER IS DUE SALVADOR'S PROSPERITY

In the coffee-tree, however, with its creamy flower and ruddy berry, rather than the rare balsam, lay the wealth of our host and of neighboring planters. A few seasons ago Salvador's coffee output totaled seventy-five million pounds. It goes mostly to France and the United States.

"We should erect a monument," a Salvadorian friend said to me, "to the Brazilian school teacher who, in 1840, brought the coffee-tree here from his own country. The day he planted that first coffee-tree in his garden he laid the corner-stone of our national prosperity."

The house in which we were entertained was built with a wide shaded veranda on three sides. With its French furnishings and cosmopolitan week-end guests, it might well have been situated in California or Florida; but the brick-paved courtyard, where coffee beans were spread to dry, was distinctly Central

Photograph from Harriet Chalmers Adams

IZALCO, THE SAFETY-VALVE OF SALVADOR

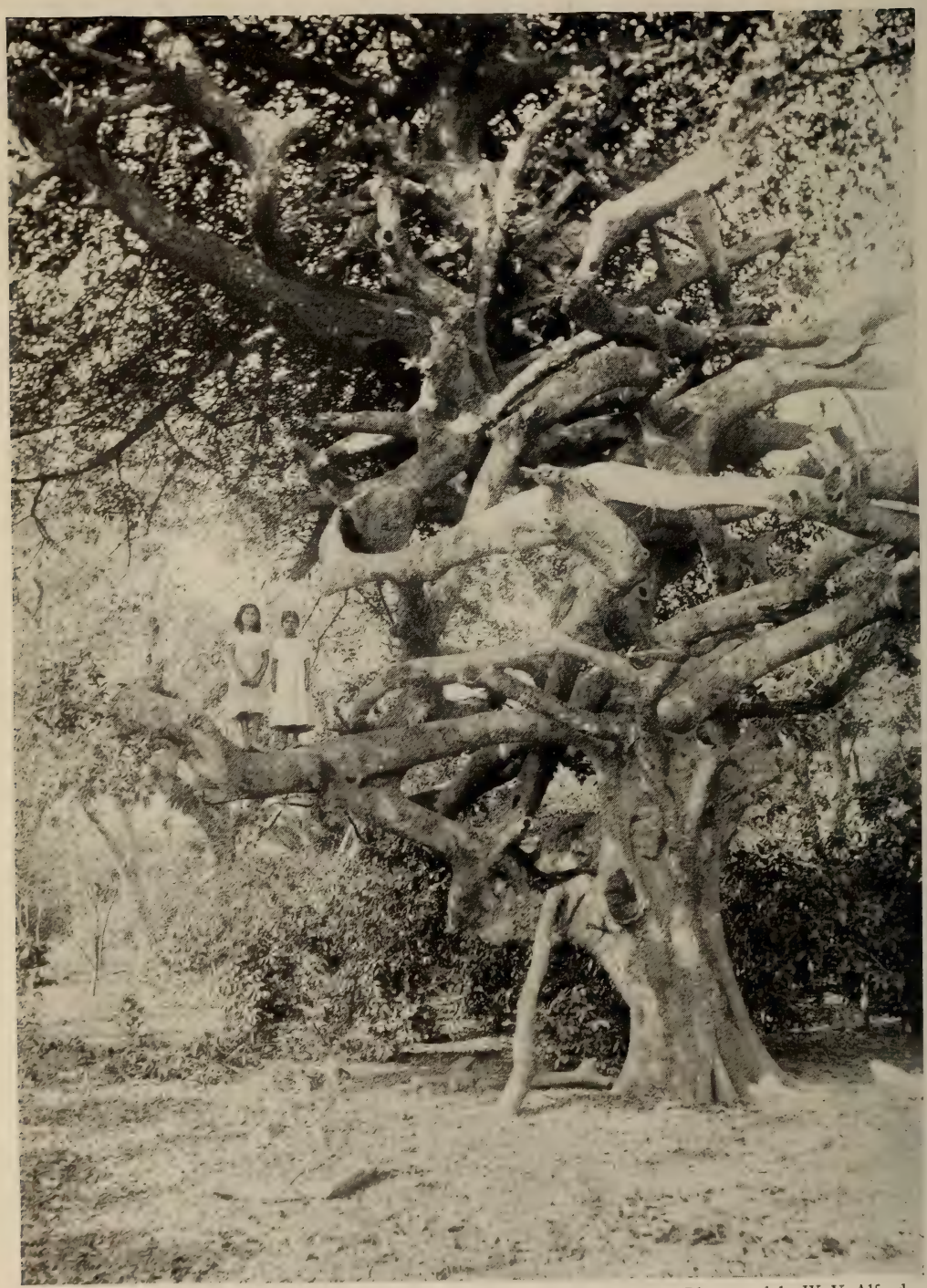
Some years ago the volcano Izalco ceased its mild daily eruption. With the loss of its safety-valve, El Salvador was imperiled. Soon another volcano erupted, with great disaster to neighboring towns and coffee estates, while a terrible earthquake nearly demolished the capital.

American. So were the sixty Indian families living on the estate.

The Salvadorian aristocracy is of Spanish and other European blood, many Britishers, Frenchmen, Belgians, Italians, and Germans having married into the old Spanish-Colonial families; but the masses are of Americ stock, with a Spanish admixture—that stock we loosely call Indian. Salvador boasts of having very little African blood.

Often on the highway I met a bronzed man or woman with those pronounced features and unique profile typical of the ancient Maya people whose temples, in jungle-clad ruin, are strewn from Honduras to Yucatan. Such place names as Chalatenango, Cuscatlán, Usulután, and their like hark back to the shadowy past.

In the evening, we sat in the courtyard under a brilliant canopy of stars, listening to alluring Spanish songs with guitar accompaniment and sometimes a serenade by the *marimba* players.



Photograph by W. V. Alford

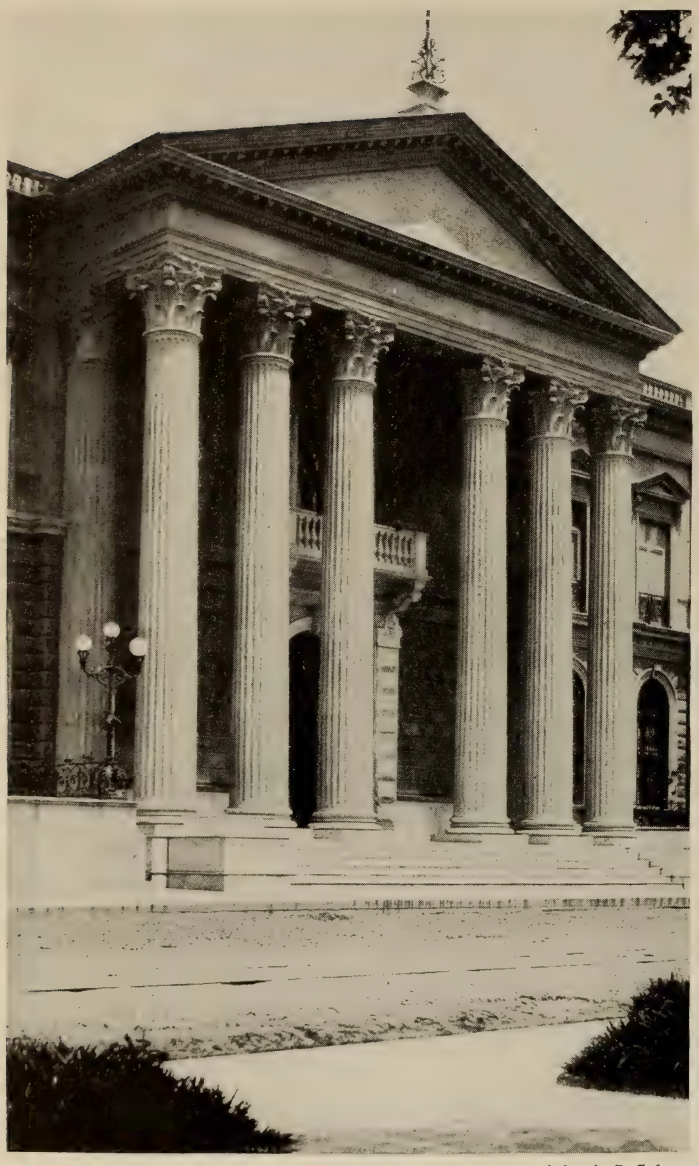
THE FANTASTIC AMATA TREE: SALVADOR

Children love to play among the twisting branches of the Amata. In the lowlands, monkeys swing by their tails from the uppermost branches, disputing the way with flocks of chattering parrakeets.

Photograph by W. V. Alford

A PLANTAIN LEAF AND A SERVING MAID

The banana and its big cousin, the plantain, are indigenous to Salvador. The banana is eaten raw, but the plantain is baked, boiled, or fried.



Photograph by A. J. Salazar

ENTRANCE TO THE NATIONAL PALACE, SAN SALVADOR

The Salvadorians of the upper class are patrons of opera and Spanish drama. Most of the coffee-planters have homes in the capital. At the leading clubs women share full privileges with the men. They are cultured and cosmopolitan, having traveled widely. Many are educated in the United States.

The marimba, a musical instrument in use among the natives before the arrival of the Spaniards, is still popular in southern Mexico and northern Central America. In structure it resembles an enormous xylophone, but in tone is more like the harp. It is played by four or eight men, who strike the keys with little rubber-tipped hardwood sticks. Now the sweet plaintive airs of Andalusia floated in on our star-lit patio; again the sad minor strains of an ancient Americ people.

VOLCANO PLAYS PRANKS WITH MINERAL SPRINGS

"Come," our host would say, when the music ceased, "let's walk up the hill and see Old Man Izalco smoke his evening cigar." Up we would climb to the summit of the ridge for a better view of the smoky-faced, rumbling-voiced volcano in semi-hourly flame.

"That mountain," one of the guests told me, "rose unexpectedly from the plain about a century and a half ago and has been shooting off fireworks ever since; but it hasn't yet changed its location, as has another volcano just north of here."

Then he told the story of a certain American who, on learning of the medicinal qualities of a spring near the Salvadorian-Guatemalan border, purchased the property and spent thousands of dollars on its improvement. Just as his work was completed and the mineral waters well advertised, a near-by volcano decided to erupt. During the disturbance the American's spring completely disappeared, later reappearing, some miles away, on another man's property. The new owner at once advertised a health resort.

Photograph from Harriet Chalmers Adams

ON A MAGUEY PLANTATION

Although Salvador has 1,400,000 people in an area no larger than the State of New Jersey, the soil, composed mostly of decomposed lava, is so fertile that the country is capable of supporting an even denser population. Great maguey and sugar-cane plantations occupy the lowland country.

Many and interesting were our trips in the saddle. To my amazement, the side-saddle provided me was constructed for the right foot instead of the left in the stirrup, just the reverse of the Anglo-Saxon way. At first I felt uncomfortable, but soon accustomed myself to the Central American style. Of late many Salvadorian women have adopted the safe and sane method of riding astride.

THE MAJORITY OF THE PEOPLE ARE LANDHOLDERS

Charming is the scenery throughout Salvador. Lowland forests alternate with highland plateaus; pleasant pasture lands with rugged valleys. Instead of fences, bordering the highway are rows of giant cacti and flowering hedges. The scarlet poinsettia flares from its emerald setting. The air is laden with the perfume of jasmine, camellias, and tuberoses, here favorite flowers. Giant ceiba trees, shading the road, harbor merry crews of chattering parrakeets. High in the branches I sometimes spied a brown monkey swinging by his tail.

Most of the people live in the healthful uplands, the volcanic region. San Miguel, one of the highest of these volcanoes, has an altitude of 7,000 feet. Nearly the entire country is suitable for cultivation, the soil, consisting mainly of decomposed lava, being exceedingly fertile. This, and the fact that the majority of the people are landholders, accounts for the teeming population, the industry and contentment to be noted everywhere.

One of the oldest of the products, long the chief export of the country, is indigo. This native plant (*jiquilite*) supplied the blue dye of the ancient inhabitants. Sugar now ranks as an important export. In the days of the forty-niners, the greater part of the rum consumed by the California miners came from Salvador. Rice, like sugar, was brought from the Old World; but cacao, corn, and tobacco are indigenous. Turkeys are kept in flocks in the tobacco fields to devour the

Photograph from Harriet Chalmers Adams

A MARKET-PLACE IN A COUNTRY VILLAGE: SALVADOR

Almost anything can be grown in the highland region of this tropical country, two thousand feet above the sea. Corn and beans are the staple articles of food among the poorer classes. Corn cakes, sturdy cousins of our hot cakes, form the plate on which the beans are heaped.

Photograph from Harriet Chalmers Adams

MARIMBA PLAYERS, POPULAR MUSICIANS OF NORTHERN CENTRAL AMERICA

The marimba, a musical instrument which somewhat resembles the xylophone, is played by four or eight men, who strike the keys with rubber-tipped hardwood sticks, and the music is not unlike that of the harp.

worms and insects on the tender leaves of the plants.

Corn and beans are the staple articles of diet among the poorer classes. Corn cakes (*tortillas*), sturdy cousins of our hot cakes, form the plate on which the *frijoles* are heaped.

Coffee is prepared in the form of a strong extract, a teaspoonful or two being added to a cup of hot milk. Among tropical fruits, I here first became acquainted with the delicious nispero, the fruit of the tree *Achras sapota* which supplies the sap known commercially as chicle, the basis of chewing-gum (see page 111).

BY HIS OX-CART YOU KNOW A SALVADORIAN'S HOME

A picturesque touch on the highways of Salvador is the archaic ox-cart. Like the head-dress of the Andean Highlander, the Salvadorian ox-cart changes with the locality. Those with solid wheels hail from beyond the Lempa River, which flows in from Honduras. Bamboo sides on the cart indicate that the owner lives in a lowland region; cane sides, the sugar district; hide lining, the cattle country.

On one of our saddle journeys we rode up to a railroad station and bought tickets for ourselves and our mounts, riders and horses boarding the same train. Almost every train carries an animal-car. In an hour we got off and once more started across country.

One of these journeys took us through the cattle country. Cattle are not only abundant, but seem to thrive with little or no attention. Beef is moderate in price. As in all tropical countries, meat must here be cooked and eaten the same day the animal is killed.

Gold and silver rank high among Salvador's products. Up-to-date methods in gold mining were introduced twenty years ago, when an energetic American engineer obtained a property of high-grade ore and installed, with British capital, a most complete equipment. Later, acquiring a large tract of low-grade ore, he agreed to permit government students to complete their studies in mining and metallurgy at his properties. Thus Salvador secured, without expense, a modern mining school.

After the Armistice I again visited Salvador. San Salvador, the capital, with 75,000 inhabitants, is connected with the port of Acajutla by an English railway. It lies 65 miles inland and a little over 2,000 feet above the sea. The railroad crosses the territory devastated by the 1917 lava flow from the volcano, San Salvador. The country's loss was estimated at $15,000,000. It required six months to rebuild that portion of the railroad which was swept away.

SCARS OF THE LAVA FLOW OF 1917

On both sides of the track tower fantastically shaped lava hills. Here and there a great tree, which withstood the flow of boiling mud and burning lava, stands isolated among the ruins, with a tiny green oasis at its feet. I was reminded of those tragic fields at the French front as I saw them in 1916.

The capital, even in the shadow of its smoking namesake, was quickly rebuilt. Although founded in 1525, it has quite a modern air. While one-story structures predominate, there are a number of splendid government and municipal buildings of reinforced concrete and several fine parks.

Because of tragic lessons of the past, the Cathedral is constructed of wood painted to resemble stone. The capital's name, San Salvador, was chosen by Alvarado, its pious founder, in commemoration of his final decisive victory over the Indians of Cuscatlán, on the eve of the festival of San Salvador.

WOMEN ENJOY FULL PRIVILEGES WITH MEN IN SALVADOR'S CLUBS

The planters spend part of each year in their town houses. To those who picture the life of all Latin American women as secluded and overchaperoned, it may come as a surprise that the Salvadorian women of the educated class live much as we do.

In the capital's two leading social clubs, wives, mothers, sisters, and daughters of members enjoy full privileges with the men. Many of these women have been educated abroad, are accomplished linguists, go in for athletic sports, and share with the men the responsibility of large country estates.

The upper classes are most progressive, a large proportion having traveled exten-

Photograph from George R. King

THE COUNTRYWOMEN OF SALVADOR ARE INDUSTRIOUS AND CONTENTED

Most of the Salvadorians are land-holders in a small way, which accounts for the universal industry and contentment. The women do most of their household work out of doors, under the shadow of the trees. Among the lower classes Indian features are in evidence. There is very little African blood in Salvador.

sively and adopted foreign ways of living. Their adaptability, energy, and patriotism promise much for the future of a country so richly endowed by Nature, one which could easily support double the population.

Lake Ilopango, a favorite society resort, ten miles by motor highway from the capital, is a scenic gem. The surrounding verdure-clad mountains dip steeply into the sapphire lake. Hotels and bath-houses dot the shore and launches skim merrily over the water.

While the elite buy in Europe and the United States, the masses content themselves with native manufactures, wearing home-made clothes, hats, and shoes. Many cling to the primitive type of dwelling, dirt-floored and thatch-roofed, so well suited to the climate.

There are a few shops in San Salvador with our type of show-windows, but the majority of the stores are the kind found in most Latin American towns, in Spain, and the Orient, where one main entrance serves for door and window. Here everything from lard to stationery is sold.

The main market overflows into the surrounding streets. Besides the native merchants, Chinese, Turks, and Arme-

nians are in evidence. Delicacies in the food line, unfamiliar to us, are fresh-water shrimps the size of small lobsters, tortoise eggs, and snails.

City property pays a tax, but rural property pays nothing to the state and only a small sum to the municipal authorities. The main income of the state comes from the export and import duties, the exports exceeding the imports.

Many of the small farmers are tradesmen as well. Coming into town with their ox-carts laden with country produce, they return home with supplies for their own stores. Fully 85 per cent of the nation's commerce belongs to natives.

SALVADORIANS WERE FIRST TO ATTEMPT FEDERATION

The Salvadorians were the first to attempt, many years ago, the establishment of a Central American federation. This union, again effected, embracing the republics of Honduras, Salvador, and Guatemala, may ultimately include Nicaragua and Costa Rica. The city of San Salvador would seem to be the logical center of the new republic, but Tegucigalpa, Honduras, which has been chosen as the capital, would prove a more central point for an expanded Central American union.

On leaving the capital, I motored across country to the port of La Libertad, which, like Acajutla, is an open roadstead. East of La Libertad lies the landlocked harbor of La Unión, in the beautiful Gulf of Fonseca—a gulf shared by Salvador, Honduras, and Nicaragua.

An American railway is being built from La Unión to San Salvador. At the time of my last visit all but forty miles of this line had been completed, the remaining link being covered by auto-stage. West of the capital the same company has completed the railroad to within 105 miles of Zacapa, the nearest point on the Guatemalan Railway. When this stretch is finished Salvador's capital will have rail communication with New York and be in close touch with Puerto Barrios, the Guatemalan port on the Atlantic seaboard.

The Salvadorians now reach our eastern States by steamer from Acajutla to San José de Guatemala, on the Pacific; by rail across Guatemala to Puerto Barrios; by sea to New Orleans. The west-coast voyage to San Francisco is popular.

Many Central American boys and girls are educated in San Francisco, where there is a large Spanish-speaking colony. I should say that one's visit to Central America really begins the first day out at sea from San Francisco, as the majority of the passengers on all ships bound for Panama are Central Americans.

It was in the Gulf of Fonseca that I became acquainted with the tortoise-shell industry. The shell of commerce is obtained from one species of turtle out of a variety of nearly two hundred. This is the hawksbill* which abounds in Central American waters. The turtle was revered by the ancient inhabitants of this region, as evidenced by the sculptures on the altars of the Maya.

In the Gulf of Fonseca a fleet of diminutive schooners sails out to gather the tortoise-shell. Each turtle boat carries a number of smaller boats equipped with a net weighted with lead, and a water-glass.

On reaching the fishing ground the small boats are sent out with two men each, the expert at the bow searching the bottom of the sea through the water-glass. This instrument is a wooden box with an ordinary window-pane fitted into one end. In the clear tropic waters the bottom can be seen at the depth of one hundred feet or more.

When the turtle is discovered on the sea floor, it is netted; when swimming under the surface, harpooned. Sometimes the animal is killed outright and the thirteen plates of the carapace forcibly detached; again the shell is softened by applying heat.

From the mottled, transparent shell, native workmen fashion combs, brooches, trays, and innumerable small articles. The lack of proper equipment for cutting and polishing makes the combs on sale at La Unión a bit rough for use. I later had my really beautiful Salvadorian comb smoothed and polished.

I think of El Salvador as a fresh and smiling little country whose people form a limited aristocracy, cultured and hospitable; an increasing middle class, industrious and happy; and, nearer the soil, a mass of *peons*, poor and ignorant, but well nourished and contented.

* See "Certain Citizens of the Warm Sea," in the January GEOGRAPHIC.

COSTA RICA, LAND OF THE BANANA

By Paul B. Popenoe

THE geography of Costa Rica is a repetition of that of its sister republics of Central America: masses of mountains arranged without much regard for symmetry, but furnishing many fertile valleys and occasionally spreading out into rich table-lands which provide admirable grazing; few navigable rivers or good harbors, and a low, rich coastal plain, hot and unhealthy.

Its northern and southern boundaries, long in dispute with Nicaragua and Panama, respectively, have recently been settled by the usual procedures of compromise and arbitration. The northern boundary was important half a century ago, when the only access to the republic on the Atlantic side was through Greytown, Nicaragua, by canoe up the Colorado River, and thence on horseback over a rough trail to the capital. The establishment of Port Limon allowed this traffic to die and the northern portion of the country to relapse into its primitive condition.

The Aguacate range is largest in the mountain system, but many of the greater peaks are more or less isolated, rise as high as 11,000 feet, and are often active volcanoes. Blanco, in the south, is considered highest; better known is Irazu, which is blamed for earthquakes that have twice practically wiped out the city of Cartago, lying at its base.

SAN JOSÉ IDEALLY SITUATED

San José, the capital city, with 50,000 inhabitants, including its suburbs, is set near the center of the republic, in a broad valley surrounded by picturesque mountains. It is the nucleus of the coffee district, holds a strategic position with regard to the Aguacate Mountains, chief source of mineral wealth, and is favorably situated for shipping to all points in the interior. Most of the developed land is east and west of it, the territory north and south being much less utilized.

Although the coast is lacking in good harbors, that at Port Limon, on the Atlantic side, has been converted into a satisfactory port of entry by English capital.

The Pacific port of entry, Puntarenas, is still lacking in wharfage facilities, but is well protected by its situation in the broad Gulf of Nicoya, one of three great indentations which make the republic conspicuous on any map.

Below the Gulf of Nicoya, which runs up 50 miles to the broad plain of Guanacaste, where stock-grazing is the principal industry, is the Golfo Dulce, a large inlet into a region which is still undeveloped.

CHIRIQUI LAGOON AS LITTLE KNOWN AS IN COLUMBUS' TIME

Opposite Golfo Dulce, on the Atlantic coast, is the Bay of Boca del Toro and the famous Chiriqui Lagoon, which figures so largely in Columbus' account of his voyage along the coast and is still nearly as unknown as when he saw it. The Indians continue their primitive life, resenting intrusion from strangers, and the authority of the government there is as nominal as that of Mexico over the Indians of remote Yucatan.

There are no lakes of any size within the republic. Navigable rivers are nonexistent, save for some tidal streams along the coast that play an important part in the transport of bananas to the point of shipment. The streams of the country are mere mountain torrents, in some places deep enough for canoe travel, but more valuable as sources of power.

The Pacific coastal plain is narrow and unimportant, occupied by jungle, where the principal industry is hunting monkeys for their skins, which usually appear on the furrier's list under an entirely dissimilar name. At the head of the Gulf of Nicoya was formerly a great hunting ground for egrets, but it is very likely exhausted by this time.

The Atlantic coastal plain is wider and richer, chiefly given over to the banana industry.

As will be judged from the description, Costa Rica is not overpopulated. With an area about half that of the State of Pennsylvania, the latest estimate (December, 1918) was 459,423 inhabitants, of whom only a few thousand were set down as aborigines. It is probable that

Photograph by H. Wimmer

LOADING A STEAMER WITH BANANAS AT PORT LIMON, COSTA RICA

With the decline in the price of coffee at the beginning of the century, the banana became the "staff of Costa Rican trade." Forty years ago the annual export of bananas was not more than 3,500 bunches; today, in banner years, the number reaches 9,000,000, and three-fourths of the fruit comes to the United States.

Photograph by H. Wimmer

PICKING COFFEE IN COSTA RICA

The towering bananas are planted in the coffee groves to provide shade for the more delicate tree. The tedious work of picking the ripe coffee berries is done chiefly by women and children. As the berries are picked they are taken by ox-cart to the near-by mill, where the pulp is torn away from the beans, which are allowed to ferment in water for a few hours, then dried for a week, polished, sacked, and shipped (see text, pages 207 and 208).

Photograph by H. Wimmer

CUTTING BANANAS ON A COSTA RICAN PLANTATION

A cutting "gang" usually consists of three men. The "cutter," using a long pole to which a special kind of knife is attached, nicks the tree trunk—in reality a leaf-sheath—a few feet beneath the bunch, the weight of which makes the trunk bend where it has been cut. The bananas are then eased upon the shoulders of the "backer," who carries them to the "muleman," or to the freight cars. The tree is then cut off near the roots, its decayed stalk acting as a fertilizer for the soil.

Photograph by Central News Photo Service

THE RAILWAY TO COSTA RICA'S ATLANTIC COAST TRAVERSES PICTURESQUE COUNTRY

Costa Rica now boasts 402 miles of railway, connecting its capital, San José, with both the Atlantic and Pacific ports and penetrating the interior. When proposed lines are completed, Port Limon, on the Atlantic side, will be connected by rail with the new port of Almirante, in Panama.

many genuine aborigines were not enumerated, however; and of course many of mixed blood, who are far more Indian than Spanish, were excluded from this category. There are some 18,000 colored British West Indians on the banana farms of Limon province.

Mixture of blood is naturally the basis of the whole population, but the Spanish element preponderates to a greater extent than in any other Central American republic. This European infusion is evident everywhere—in the superior intelligence and civilization of the inhabitants and in the excellence of the Spanish which is universally spoken.

© Publishers' Photo Service

A PEON TYPE OF COSTA RICA

Then, too, the aborigines seem to have been a mild, easy-going race of agriculturists, with none of the lust for martial conquest that characterized some of the Mexican and Guatemalan stocks, and this undoubtedly played a part in forming the present-day population.

Graves of these original inhabitants, which are being constantly unearthed, indicate that they had a fair amount of civilization, making passable pottery and working many ornaments rather crudely in gold, although stone images which they have left show that artistically they were far inferior to the civilizations of the Mexican-Guatemalan region (see pages 109-130).

These images are a constant object of search, of course, in all parts of the republic, and the frequency with which they are found shows alluvial gold to have been more plentiful some centuries ago than it is now.

Aside from Spanish immigrants, who are numerous, the foreign population is only a few thousand, mostly men engaged in business or mining. Plantations are in the hands of natives, outside the banana industry.

MILLIONS OF BUNCHES OF BANANAS EXPORTED ANNUALLY

It is needless to say that agriculture is the chief industry and resource of the republic. In fact, just now it is almost the sole resource, since manufactures are lacking and mining is almost suspended. Bananas hold first place, with 95,400 acres under cultivation; coffee follows, with an annual yield reaching 24,000,000 pounds. Maize, sugar-cane, rice, and potatoes are other important crops.

Costa Rica's banana industry has been created by an American fruit company, which has a monopoly. The rankly fertile soil of the coast has been cleared of natural growth and plantations extended year by year, principally to the north of Port Limon, while light railways bring the crop to tidewater, where it is loaded on barges and taken to Port Limon for transshipment in the company's own steamers (see page 202).

The republic sends to the United States more bananas than any other country—from 7,000,000 to 9,000,000 bunches a year—and they are of high quality. As the industry represents an entirely for-

eign exploitation, it is not of such vital interest to the people as is coffee. A failure of the banana crop affects the profits of the fruit company; a failure of the coffee crop affects every bank in Costa Rica, and may even threaten the stability of the administration then in power, since voters do not always reason closely from cause to effect, in times of financial stringency.

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THE SUNSHINE OF A COSTA RICAN SMILE

AMONG BLOOMING COFFEE-TREES

Surely, not even Japan in cherry-blossom time can be more beautiful than the coffee country, occupying valleys at an elevation of from 3,000 to 5,000 feet, when the snow of the blossoms hangs like a mantle over the land, and their perfume subdues the strong scents of the forest. Plantations are mostly small, peasant proprietorship being the rule, and each has its one-room house with a tile or corrugated iron roof covering a heterogeneous assortment of men, women, and children, monkeys, parrots, and dogs. But the industry can be better studied on a larger *finca,* that of 50 acres, which I have in mind, near San José, supporting 50,000 trees.

As we walk between the rows of bushes, six feet high and colored with the deep but vivid red of ripe berries, the manager explains the situation.

"These trees," he says, "are five years old and just beginning to bear profitably. They are kept two years in our nursery and then transplanted to the orchard, where it requires three years to bring them to maturity. They will then bear for five or six years, when they cease to be profitable and are cut down.

"We are planting new trees every year in the place of old ones, and thus keep our plantation at the highest point of bearing efficiency all the time (see p. 208).

"These bananas you see planted among the trees are for shade, which the coffee-tree requires constantly, especially when young" (see page 203).

The coffee is being picked at the time of our visit. The work is mostly done by women, with a few men and children scattered among them. A peon can put his whole family to work during coffee-picking time and have them earn enough to support him in idleness for the rest of the year. The work is slow and tedious,

Photograph from Mrs. Martha Toeplitz

A YEAR-OLD COFFEE-TREE

For the first two years the tree is kept in a nursery, and then transplanted to the orchard, where it requires three years to come to maturity. Its bearing life is from five to six years, after which it ceases to be profitable and is cut down. Costa Rican coffee finds its best market in London, while the United States seems partial to the Brazilian product, which constitutes more than half of the billion pounds we consume annually.

as the berries are scattered and must be picked one at a time by hand and dropped in a basket; but the women can gather 200 pounds in a day.

As fast as the berries are picked they are hauled by ox-cart to the *beneficio,* or mill, whither we now turn our steps.

"How many laborers do you employ?" we ask.

"During the wet season, or from January to July, only three or four—just enough to keep the weeds down; but during the dry season, when coffee is ripening every day, we have to keep 15 or 20 pickers constantly on hand, besides a dozen men to cure the beans."

PREPARING COFFEE FOR MARKET

The process of preparing coffee for market is, briefly, as follows:

As fast as the berries are brought in, they are put through the pulper, a machine something like a corn-sheller, run by a water-wheel, which tears off the outside pulp from the beans and separates them. The beans are then put into a large tank and allowed to ferment overnight in water, after which they are thoroughly washed by being worked over with a large wooden hoe in running water and trampled out by the bare feet of the peons. During this process the dirt all comes to the top and is carried off by the current.

The beans are then spread out in the sun, on a cement floor, and allowed to dry for a week, being turned over every day (see illustration, page 188). When dry, they are put through the huller, which takes off a thin, parchment-like inner skin; they are then winnowed, put through a polishing-machine, sacked, and shipped.

"How much does the plantation yield?"

"We consider a yield of one pound per tree, or 1,000 pounds to the acre, good, although this is often exceeded. As you can easily see, the business is profitable. The main drawback is the amount of time

and money which must be spent before any returns come.

"We often plant corn or vegetables between the coffee rows while the shrubs are young; but this does no more than pay expenses at best, and many investors do not like to wait five years before they receive any returns on their money. Still, with the right management and a good climate, no one ought to lose money on coffee."

It is a mistake to suppose that the best coffee is grown in the Orient, and to talk fondly of "Mocha and Java," the first of which is seldom, if ever, and the second rarely, sold in the United States. Costa Rican coffee in open competition has several times brought the highest price on the London market, whither most of it is shipped.

Photograph from U. S. Department of Agriculture

COFFEE FLOWERS AND FRUIT, NATURAL SIZE

Not even Japan in cherry-blossom time is more beautiful than the valleys of Costa Rica, at an elevation of from 3,000 to 5,000 feet, when the coffee-trees are in bloom, the snow of their blossoms hanging like a mantle over the land and their perfume subduing the strong scents of the forest. The coffee berry is a vivid red when ripe.

Maize is grown by primitive methods, solely for local consumption, and the same may be said of sugar-cane, which is largely used for fodder, but also produces coarse varieties of sugar for home use. All the usual tropical and temperate vegetables and fruits are grown to a limited extent. The oranges of Costa Rica are excellent.

THE REPUBLIC IS RICH IN MAHOGANY, ROSEWOOD, AND CEDAR

There is some export trade in valuable timber, of which the great forests furnish a wide range, including mahogany, rosewood, and cedar. Enough cacao is grown for home use. Rubber is gathered from wild trees.

Mining has been carried on for a century, following a visit of the Bishop of Nicaragua and Costa Rica in 1815, who pointed out the rich deposits of gold in the Aguacate Mountains. These produced $7,000,000 in 20 years, under the most difficult conditions, the composition of the ores being such that they had to be sent to the Pacific coast in ox-carts, loaded into sailing-vessels, and shipped around the Horn to Europe for smelting. The high-grade ores were used up in this way, and although there is an immense body of ore carrying lower values, well

Photograph by H. N. Rudd

A PICNIC PARTY IN COSTA RICA

The Costa Ricans are among the most progressive of all the peoples living between the Rio Grande River and the Panama Canal. English capital predominates in that country. The Costa Rican children are as sunny as the skies under which they live, and picnicking time is next to Christmas in their affections.

worth handling, no one has come forward with sufficient capital to erect the expensive plant necessary.

COSTA RICA MAY BE GREAT GOLD-PRODUCING STATE

Since the abandonment of work in the Aguacate range, half a century ago, practically all the mining interests have been concentrated on the Pacific slope, where are immense ore deposits carrying gold in low values.

With further development of railways and possibility of obtaining power from streams of the coast mountains, mining is certain to have a renascence throughout the republic, which will take its place as one of the great gold-producing states of Latin-America, in the opinion of many.

The principal manufacture is that of alcoholic liquors, a government monopoly. With agriculture and mining, the list of industries is exhausted.

Public safety is as good as in the United States—I fear I must say that it is better than in some parts of the United States—and security almost absolute. It is a common saying that when a theft is reported it is almost never traced to a Costa Rican, but to an immigrant, of whom there are a good many from the West India islands, principally Jamaica negroes, who have been imported to work on the banana plantations because of their ability to stand the feverish lowland climate, which Europeans and Costa Ricans can ill tolerate.

RAILWAY LINE COMPLETED FROM SEA TO SEA

Development of the resources of the nation and of public utilities has been steady and reasonably rapid during the past 20 years. A railway line has been pushed from sea to sea, by way of San José, in spite of great engineering diffi-

Photograph by H. N. Rudd

TALAMANCA INDIAN GIRLS GRINDING GRAIN

Though these people live within a few miles of a Costa Rican railroad, they are almost totally unaffected by modern civilization. The dialect which they speak is derived from the Guetar, the dominant tongue among the Caribs.

culties. The capital has electric lights, a good electric street railway, modern sewerage, and telephones.

Although the country owes everything to foreign capital, I believe no large concessions have been given which deprived the natives of opportunity, as many Mexicans claim has been the case in their own country; for the great holdings of the American fruit company are in a region that was formerly swamp and jungle.

Besides its connections with New Orleans and New York, the Atlantic coast has direct sailings to Europe and Great Britain, while the Pacific coast is touched by steamers from San Francisco to Panama.

Sanitary conditions in the country have been rapidly improved. Yellow fever, which formerly exacted a terrible toll in the banana country of the Atlantic littoral, has practically disappeared. San José and most of the other principal cities are at such an altitude that the climate is temperate, with a mean of 60 to 70 degrees, and they are healthy.

THE STORY OF COCOS, A REAL TREASURE ISLAND

Costa Rica has one resource which is worth a digression — Cocos, a palm-fringed islet 400 miles from the mainland, off the Pacific coast of Panama. It is the supposed hiding place of the immense treasure carried from Peru a couple of centuries ago on the schooner *Mary Dyer,* which was wrecked on the island.

The story is familiar to every newspaper reader—how a revolution threatened, and all the treasure in Lima was placed on this schooner in the harbor. In the night the crew mutinied, anticipated the looters of the city, and sailed out of port with practically all the wealth of the town on board.

Photograph by H. Wimmer

TALAMANCA INDIANS FISHING WITH BOW AND ARROW: COSTA RICA

These Indians, who resemble the Maya of Yucatan in physical appearance, keep up their ancestral speech, usages, and traditions. They bury their dead in graves called *guacas,* which in times past have yielded up interesting specimens of pottery and an occasional gold ornament.

Various charts are in existence purporting to give the exact location of the hoard, which has been a constant object of search, so that in recent years a dozen or more expeditions have started or tried to start to bring it home. Those which finally arrived at the island have all failed, although many of them came away with their share of eternal hope undiminished, and I suppose the desolate place is still in possession of its long-time inhabitant, a Dutchman who digs around in haphazard fashion and raises pigs, which he can always sell at a good profit to the next exploring expedition. His mind has been unbalanced by the solitude; if he should find treasure, it will have been dearly bought.

Nearly every Costa Rican believes in the hoard; in fact, when I first went to San José I found the American consul just starting out on the quest. President Iglesias was a firm adherent of the story and put the island under strict government control, granting special concessions—for a price—to those who wished to dig. Nearly 20 years ago, when the national treasury was low, he organized an official government expedition which he expected would put the country beyond the need of taxation for the rest of its history.

The navy of the nation was very useful on this occasion to transport the party, which returned empty-handed in spite of the fact that it had been accompanied by an American with a divining rod. This was an old umbrella rib, with a bottle of "big medicine" attached to one end, and had never before been known to fail, as the inventor himself admitted; so if its testimony was true on this occasion, then the report is well founded that the pirates returned and carried off their treasure only a few years after they buried it.

REVOLUTION MADE SAN JOSÉ CAPITAL

Next to San José, Cartago is the most interesting city, having been the seat of government under Spanish rule. When the republicans established independence, in 1821, a faction in Cartago attempted to hold the province for Spain; whereupon the victorious party settled the question by removing the capital to San José, then an insignificant mountain town.

Cartago remained for years the place of residence of the aristocrats, and was also famous for its pilgrim church, "Our Lady of the Angels," built over a spring which was sought from all parts of the country for its reputed miraculous cures. More recently it sprang into prominence as the location of the peace palace which Andrew Carnegie built to solidify the friendship of the Central American republics and which, it will be recalled, was destroyed by an earthquake.

CARTAGO, DESTROYED BY EARTHQUAKE, SUBSTANTIALLY REBUILT

Cartago has always been subject to earthquakes because of its position at the foot of an active volcano. It was completely destroyed in 1841, following which it was rebuilt in a substantial way.

Alajuela and Heredia are the two largest towns on what was until a few years ago the national cart road from San José to the Pacific coast, over which all the traffic of the country passed for a century or more, although the railroad has now superseded it.

Heredia, with its historic churches, is one of the oldest and most picturesque places in the republic, while Alajuela is equally interesting. Associated with the latter's old fort are some of the most stirring events in the history of the nation.

The only other towns of importance are Liberia, the isolated capital of the province of Guanacaste, and the two ports of entry, which I have already mentioned. Puntarenas is decaying, as its Atlantic rival gains the trade. The latter contains a large English-speaking population, both white and black, due to its banana industry (see pages 202 and 204).

For beauty in Costa Rica one must, as a general rule, stay outside the cities. The country is as fine as any in the Western Hemisphere. I have met numerous globe-trotters who tell me they put views from the Aguacate Mountains (where, on a clear day, both oceans can be seen) with the two or three finest bits of scenery in the world.

The savannas, or meadows, on the Pacific slope are a perpetual joy, looking more like parks than like wild land, with their long grass and graceful palms. At every turn of the road one comes across a thatched hut with its peasant occupants,

Photograph by H. Wimmer

TALAMANCA INDIANS WEIGHTED DOWN WITH HEAVY STONES TO AID IN MAINTAINING FOOTHOLD IN CROSSING A SWIFTLY FLOWING STREAM: COSTA RICA

Costa Rica is watered by innumerable rivers, some of which flow into the Atlantic and others into the Pacific, but few of them are navigable and those only in their lower courses.

or, if he be farther from civilization, sees a troop of monkeys just out of reach, making faces at him, while in the lowlands a flock of macaws is generally near by, to add splashes of riotous color to the scene.

The peasants, who make up so large a proportion of the population, are an interesting class. Their lives are primitive, without any dispute; they have little more in the way of material possessions than their ancestors had when Columbus traded tin knives and hawks' bells for their gold ornaments. They cannot be considered industrious, for Nature provides a living too easily. The usual procedure is to burn off the sides of some ravine, plant it as a truck garden for two or three years, and then abandon it in favor of another piece of virgin soil.

Small black beans (*frijoles*) are the staple crop, which with the *tortillas,* or hoecakes of Indian corn, a little rice, and such fruit as can be had without labor, make up the exclusive diet of a large part of this agricultural population, save for an occasional bit of game which the head of the house brings in. This will probably be a small monkey, the flesh of which is esteemed a great delicacy, even by white people who have been able to overcome their anthropophagous squeamishness; but the mortality among the four-handed tribe is kept down to reasonable limits by the government's stringent enforcement of a law which prohibits importation of any guns except muzzle-loaders.

CHINESE IMMIGRATION IS A BIG PROBLEM IN CENTRAL AMERICA

Corn is probably grown in the peasant's dooryard, but the rice will have come from a Chinese trader in the neighboring village.

Chinese immigration is more of a problem in Central America than it ever was in California, if the inhabitants only knew it, for the Orientals do not stoop to manual labor, but have taken possession of a large part of the retail trade. It is an insignificant town that has not one or

Photograph by H. Wimmer

TALAMANCA INDIANS BRINGING IN THATCH

more of these Celestials, usually almost ignorant of the Spanish language, yet driving out competitors by underselling and getting rich by the closeness of their business methods. Natives seem to have a friendly feeling for Chinese, but I did not observe many cases of intermarriage.

A PEON'S GALA DAY

The Chinese merchant also furnishes the small stock of clothes needed by the peon: for the women, a skirt and low-cut waist; for the men, shirt and trousers. The shirt is often discarded in mining and many other branches of labor. Country children, of course, dispense with the luxury of clothes for the first decade of life.

On Sunday the whole family visits the nearest village to put in a gala day. Perhaps there is a religious festival in the morning; at any rate, there is a mass to be attended. Afternoon is given over to visits, which women and children usually make alone, while the man of the house hangs around the general store or post-office, as the center of interest. If he is feeling "flush," he treats himself to a can of evaporated milk, a great luxury, which he drains off through a nail-hole, just as if it were champagne.

Too frequently, however, he unearths a jug of moonshiners' liquor, a violent beverage, which is manufactured in many huts in spite of the activity of government revenue agents. If there is any of this stuff in circulation, he usually ends the day by indulging in a machete duel with his best friend, and both principals spend the night in the jail, which even the smallest villages maintain for such eventualities. The duelists awake good friends the next morning, but unfit for work for another day or two.

Bullfighting is rare in the republic; the only ring, I believe, is in the capital, and that is seldom used. Cockfighting flourishes to a certain extent, but not so much as in the more northern republics. Lotteries are popular.

SAN JOSÉ BOASTS ONE OF THE WORLD'S FINEST OPERA HOUSES

The native is an inveterate lover of pleasure and never grudges a day missed from work, if he can obtain entertainment by such self-denial. The capital contains a monument to this spirit in its

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OX-CARTS IN THE STREETS OF SAN JOSÉ, COSTA RICA

In many parts of the country one may see mahogany wheels on these carts, and in some places cedar is more esteemed as a furniture-wood than mahogany. The heavy hauling of the republic is done with these carts (see text, page 220).

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SAN JOSÉ'S FAMOUS OPERA HOUSE, "THE FIFTH FINEST IN THE WORLD"

This magnificent structure, in a city of 50,000, including the suburbs, is seldom used more than once or twice a year, when a traveling troupe gives a performance. Here, however, is held the great annual fixed social event of the republic, the President's ball, on New Year's Eve.

Photograph by H. Wimmer

THE CACIQUE (CHIEF) OF THE TALAMANCA INDIANS IN FRONT OF HIS THATCH RESIDENCE: COSTA RICA

The Indian who wears this impressive title exerts nominal authority over the two small remaining tribes of the Talamancas, who were able, at the time of the Spanish conquest, to hold their territory against all invasions of the Conquistadores. It is said that they fought "with greater valor than any other nation of the Indies."

national opera house, which is said by its builders to be the fifth finest in the world, and is certainly far superior to anything New York could boast until very recently. It was erected by imported Italian skilled labor at a fantastic cost, and is a work of art inside and out; but there is no need for it, and it is a beautiful specimen of white elephant, used perhaps once or twice a year, when a traveling troupe visits the republic (see page 217).

Sometimes the handsome building is closed for a whole year, except for the one fixed event, the President's annual ball, which is the high-water mark of social life in the republic. It is held on New Year's eve, and establishes caste lines for the following year. Debutantes' programs are filled for months in advance, and woe to the young woman who is a wall flower at the President's ball!

The common people get pleasure even from a funeral, which they always turn into quite an event, with music and a general gathering of friends. The Costa Rican is a born music-lover, and almost any one who can get possession of an instrument is able to play by ear. Small country funerals are usually preceded merely by an accordion player, who squeezes out any tune that comes into his head, ignorant of the names of all. I witnessed one such cortege in a little mining village, marching to the inspiring strains which the American engineers had been whistling, "There'll Be a Hot Time in the Old Town Tonight."

The great religious festivals are, of course, marked by intense enthusiasm, Christmas being celebrated for the better part of a week. These festivals are usually notable for the good nature and good order of the crowds.

The people are essentially law-abiding and the standard of morality is in most respects high.

NATIVE LIFE IS BEST SEEN FROM HORSEBACK

One sees native life at its best by a horseback trip through the country, and there is every facility for making this, since it is the customary way of travel with all except those who are poor enough to walk.

Heavy baggage is sent ahead in an ox-cart, and the traveler rarely fails to find a hotel at night. He does not encounter much luxury in these village inns, but cleanliness is present to a reasonable degree, and the food, if not up to Parisian ideas, is nourishing.

If the traveler is in the neighborhood of a mining camp where there are North Americans, he is sure of a welcome and comfort; he is equally sure of the former, but not the latter, in any peon's hut.

The railway is invaluable for exporting freight, but the Pacific division has never been up to standard for passenger accommodation. When I lived on the west coast the service was so infrequent that it was the custom to hire a special train whenever one wanted to make a trip. This was not expensive and had the advantage that one could ride in the engineer's cab if he chose.

NO LONGER HOSTILE TO UNITED STATES

For many years subsequent to General Walker's filibustering invasion of Nicaragua, in 1856, there was a strong feeling of hostility toward the United States on the part of Costa Ricans. With two new generations, this has practically disappeared, and while there still exists in some quarters a little unfounded apprehension as to the political ambitions of the larger republic, it is gradually being eliminated, so it may be said without reserve that the Costa Ricans are on the whole distinctly friendly to our country.

This will not only encourage American capital to take advantage of some of the many opportunities which are offered there under a stable government, but it is each year leading a larger number of tourists, anxious to become better acquainted with their neighbors, to make the trip and enjoy it. Many of them are naturalists or nature-lovers, for whom the territory is a notably rich field, being the meeting ground of the flora and fauna of North and South America.

For a leisurely voyage, the Pacific route has some advantages, since the steamers stop at nearly all Central American ports and often occupy three weeks in the trip from San Francisco to Puntarenas. The more frequented route, however, is either from New York to Port Limon, 12 to 14 days, or from New Orleans to Port Limon, five to seven days.

Photograph by H. Wimmer

EXCELLENT PROSPECTS FOR SOUP

From the semi-tropical waters of Mexico, Central America, and the West Indies come highly prized turtles for the markets along our eastern coast.

From the port travelers go directly to the cool and healthy country about the capital, where there are good hotels and a colony of Englishmen and Americans.

Summer clothing is necessary, but overcoats and wraps for evening wear should not be omitted. Obviously, umbrellas and waterproofs are desirable for the rainy season; but dangerous storms are almost unknown.

Those who wish to spend the winter, which at San José is a most delightful season, may rent a good house, centrally located, at a nominal figure. Most of the residences are of one-story, in the typical Latin-American style, built of adobe and brick, with tile or galvanized iron roofs, around a courtyard or patio, where is a fountain, flowers, and shrubbery. Roses bloom the year around, and there is never a month when the lemon tree, a fixture in every patio, fails to yield its fruit for household use.

One buys all meat, vegetables, fruit, and kitchen supplies in the market, which is one of the most interesting sights of every city and a never-failing source of interest to newcomers. Saturday is the principal trading day, when country people come in with their little bundles of produce and the streets around the marketplace are jammed with ox-carts, which still do all the heavy hauling in the republic (see page 216). Living is cheap and good, except for meat, which is dear and tough.

With the increasing tide of travel and commerce constantly flowing back and forth, Costa Rica and the United States are coming to know each other better, and mutual respect is being increased by the acquaintance.

OUR MAP OF THE COUNTRIES OF THE CARIBBEAN

LOOKING southward from the shores of our Gulf States, the geographer surveys a group of ten republics of vast potentialities, clustered in and around two great warm seas. In addition to these independent republics, the waters of the Gulf of Mexico and the Caribbean Sea are dotted with innumerable tropical islands of riotous vegetation belonging to the United States, Great Britain, France, and the Netherlands.

These semi-inclosed seas have been aptly termed "The American Mediterranean," for, crisscrossing and meandering through the channels between the Gulf and Caribbean islands run the great ocean lines of an ever-increasing commerce.

No other region of the Western Hemisphere embraces so many geographical names of historic significance as that charted on the "Map of the Countries of the Caribbean," which is issued as a supplement to this number of the NATIONAL GEOGRAPHIC MAGAZINE.*

A REGION OF ROMANCE AND HISTORY

Here are place names which quicken the imagination and the romantic impulses of the most prosaic:

The first land of the New World sighted by Columbus on his epochal voyage of discovery was Watling Island, among the Bahamas, and on its sandy beach, on the morning of October 12, 1492, he knelt "to give thanks to God and kiss the ground with tears of joy for the great mercies received."

The first settlement in the New World was that established by Columbus in Santo Domingo, and the fort built for that colony was constructed from the hulk of his wrecked flagship, the *Santa Maria*.

The first permanent settlement within the bounds of what is now the United States was made by the Spaniards at St. Augustine, Florida, in 1565.

The foremost intellectual achievement of ancient America (see pages 109-130) was consummated in southern Mexico, Guatemala, and Honduras, and such ruins as those at Tical, Chichen Itza, Copan, and Quirigua continue to yield their fascinating secrets to explorers and archæologists.

It was from a height on the Isthmus of Darien that a European eye looking westward first caught a glimpse of the mighty "South Sea."

It is across the Isthmus of Panama that American genius for organization, sanitation, and mechanics has achieved the greatest engineering feat in the history of mankind—the Panama Canal.

The waters of Havana Harbor hold a sacred interest for America as the place of destruction of the martyred U. S. S. *Maine*.

In Caracas, the scene of his earliest efforts to free South America from the Spanish yoke, repose the ashes of the Great Liberator, Simon Bolivar.

Throughout the Greater and Lesser Antilles are countless harbors of refuge and lairs redolent with legends of the buccaneers of the Spanish Main (see pages 146-187).

LANDS OF PHENOMENAL AGRICULTURAL AND MINERAL WEALTH

As for material wealth, what other part of the globe can rival the cotton plantations of Mississippi, Louisiana, and Texas, the oil fields of Texas and Tampico, the sugar and tobacco lands of Cuba and Porto Rico, the banana plantations of Costa Rica, the sisal fields of Yucatan, the coffee groves of Salvador, the platinum and emerald mines of Colombia, or the asphalt lakes of Trinidad?

Only a few years ago the wealth, the beauty, the romance, and the historical remains of this vast region were shut off from northern civilization by the dread barriers of disease, and the inhabitants themselves were in constant peril of devastating epidemics. He who went

*Additional copies of the Countries of the Caribbean Map are obtainable from the headquarters of the National Geographic Society, Washington, D. C., at $1.00 each in paper, $1.50 in linen; maps in color of the New Europe (30 x 33 inches), Asia (28 x 36), South America (25 x 35), and Islands of the Pacific (19 x 25) at the same prices.

into the countries of the Caribbean not merely "took his life in his hands," but staked it upon the appetite of the yellow-fever-bearing mosquito.

Today, thanks to the genius and the sacrifices of American medical science, these lands are purged of such scourges and are as safe as our own climes (see text, page 140).

But even twentieth-century science bows to the meteorological forces which make of the Caribbean area the terrible "breeding ground" for the irresistible forces of the wind, for here originate the hurricanes which periodically loose their destroying strength upon plantation and settlement, upon puny man and his ships at sea, and sweep up our own Eastern and Gulf seaboards with devastating effect.

As if to make amends for releasing the Pandora curse of storms, however, Nature has also made this region the birthplace of that wonderful, beneficent warm-sea river, the Gulf Stream, which the late Admiral Pillsbury, formerly President of the National Geographic Society, appropriately called "the grandest and most mighty terrestrial phenomenon" (see also page 153).

AN AREA RICH IN INTEREST FOR THE STUDENT OF GOVERNMENT

To the political economist the republics to the south present a subject of absorbing study in the development of popular government. Some of the nations are still in a state of political flux. This is especially true of the newly formed Republic of Central America, composed of Guatemala, Honduras, and Salvador and, prospectively, of Nicaragua and Costa Rica.

The recent revolution in Guatemala has given the proponents of the union a temporary setback, but the most earnest friends of Latin America are confident that in such a union is the ultimate solution of a stable state, of economic administration, and of gratifying commercial and social advancement.

The constitution of the republic was signed by Guatemala, Salvador, and Honduras in September, 1921, and became effective on the first of the following month.

According to the plans at this writing, the permanent government is to be established this month (February 1, 1922). It is to be republican in form and will consist of three branches—the executive, legislative, and judicial.

THE MAP REPRESENTS MANY MONTHS OF RESEARCH

In few parts of the world has less been accomplished in accurate surveying than in certain portions of Central and South America.

In the compilation of data for the "Map of the Countries of the Caribbean," therefore, it was necessary to investigate and verify many sources of information. In this work the National Geographic Society's cartographers and research experts had the cordial coöperation of United States Government departments in Washington, of which the Hydrographic Office of the Navy and the Graphic Section of the General Staff, War Department, were especially fruitful sources. In addition, the several legations of Central American countries gave valuable assistance.

For data on specific points, The Society is indebted to numerous explorers and geographers, who have from time to time been contributors to the NATIONAL GEOGRAPHIC MAGAZINE, and who were able to give first-hand information concerning railroads recently built and in the course of construction and others which have been abandoned.

The resultant map, it is confidently believed, affords the most concise and accurate information obtainable on this part of the world.

The issuance of the "Map of the Countries of the Caribbean" as a supplement with the February GEOGRAPHIC is in continuance of The Society's map program begun in 1921, when large scale maps in colors were compiled and issued of the New Europe, Asia, South America, and the Islands of the Pacific.

Later in 1922 generous scale Maps of Africa and of the World, on which work has been progressing for two years, will be issued.

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PREHISTORIC TELEPHONE DAYS*

By Alexander Graham Bell

Author of "Discovery and Invention," "A Few Thoughts Concerning Eugenics," "Prizes for the Inventor," "Who Shall Inherit Long Life," etc., in the National Geographic Magazine

I WAS over in England the other day and was rather startled and amused by some of the greetings I received while there. Upon one occasion I was introduced to a lady as "the inventor of the telephone," and what do you think she replied? "Well, Mr. Bell," she said, *"I thought you were dead long ago"!*

Well, I am not dead yet; and I can assure you that it gives me great pleasure to be able to be with you today and meet the Commissioner and the ladies and gentlemen connected with the Patent Office.

I have been thinking a good deal about what I could say to you here. Of course, you expect me to say something about the telephone, but I rather think that you know more about the telephone today than I do.

When I heard the Commissioner remark that there had been more than 8,000 patents granted in the telephonic department, and thought of the multitude of interferences that must have arisen, and the thorough way in which you must have examined into the past history of the art, I came to the conclusion that there was not much use in my telling the examiners of the Patent Office anything about the history of the telephone; you are familiar with it already.

*An address before the officials and examining force of the U. S. Patent Office. Revised from the stenographer's notes and largely rewritten for publication in the National Geographic Magazine.—A. G. B.

My only hope of telling you anything you don't know is to give you a few personal reminiscences concerning what we might term "Prehistoric Telephone Days." Here I have a clear field to myself, for there are certainly few, if any, persons now living who are competent to speak of my boyhood and the various influences, hereditary and environmental, that molded my early life and led me onward irresistibly in the direction of the telephone.

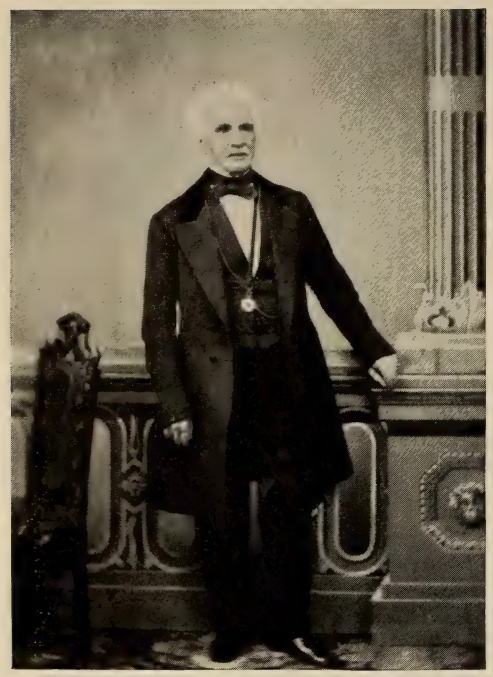
Here I am afraid I will have to go back to my grandfather, Alexander Bell of London, England (1790-1865).

He was an elocutionist and a corrector of defective utterance. He was the first in the family to take up the study of the mechanism of speech with the object of correcting defects of speech by explaining to his pupils the correct positions of the vocal organs in uttering the sounds that were defective.

EARLY EDUCATION

My early boyhood was spent in Edinburgh, but when nearly fifteen years of age I went to London and stayed for a year with my grandfather. I had there no young companions of my own age, and this year spent alone with an old man had a profound influence upon my whole future life.

My grandfather took a great deal of interest in my education. My school life had been characterized by great indifference to the usual school studies and I took a very low rank in my classes. The



ALEXANDER BELL OF LONDON

Elocutionist and corrector of defective utterance, who exerted a profound influence on his grandson, Alexander Graham Bell.

Photograph by Edinburgh Society

ALEXANDER GRAHAM BELL AT TWENTY

From early childhood the inventor of the telephone evinced a great interest in the study of sound and the art of speech.

ALEXANDER MELVILLE BELL IN 1868

The father of Alexander Graham Bell, who devised a universal alphabet for recording the sounds of all languages (see page 228).

Photograph by the Parisian Studio

MRS. ALEXANDER MELVILLE BELL

The mother of Alexander Graham Bell, whose paintings reflected an artistic nature which was transmitted to her son as a gift for music.

subjects in which I really excelled, such as music, botany, and natural history, formed no part of the school curriculum. For Latin and Greek I felt no taste. Geography, too, I found dry and uninteresting.

In arithmetic alone I think I took an average stand. My knowledge of the processes of arithmetic was fairly good, but I failed sadly in the execution. In exercises in proportion, for example, I found little difficulty in stating the proportion correctly, but could rarely work out the correct answer, on account of the mistakes in addition, subtraction, multiplication, and division.

My poor standing in school was, I think, the result of lack of ambition rather than of real lack of ability, for I excelled in the unusual studies I pursued out of school hours and in which I took a real interest.

MUSIC WAS AN EARLY PASSION

Music especially was my earliest hobby. I learned to play the piano at such an early age that I have no recollection now of a time when I could *not* play. I seem to have picked it up by myself without any special instruction, and although I knew nothing of written music, I could play anything I heard by ear and could improvise at the piano for any length of time.

Of course, it is difficult for me now to form any true estimate as to what my real abilities were in this direction as a little child, but some circumstances seem to indicate that they must have been exceptional.

A distinguished professor of music, Signor Auguste Benoit Bertini, heard me improvising at the piano, and when he found that I had received no instruction in music and knew nothing of notes, he adopted me as a musical protégé. For some months he gave me instruction in his system of reading music at sight.

He was then an old man and did not live long. I have a faint recollection of my last interview with him, when he presented me with everything necessary to teach his system of music and expressed the hope that when I grew up to be a man I would not let him be forgotten. After his death I received no further formal instruction in music excepting from my mother, who sought to carry out Bertini's ideas as well as she could.

"MUSIC WAS MY EARLIEST HOBBY"

It is rather a curious fact that the moment I learned to read music from notes I gradually lost the faculty of playing by ear.

The promise of my early childhood in the musical direction did not materialize, and although during the whole of my boyhood my great ambition was to become a musician, I gave up music when I entered upon the work of teaching the deaf.

I am inclined to think, however, that my early passion for music had a good deal to do in preparing me for the scientific study of sound.

NATURE STUDY

As a child, I took a great deal of interest in flowers and plants and formed a large herbarium, arranged according to the Linnean system of botany.

I am inclined to think now that I must have had assistance, probably from my father, in studying botany. It is very unlikely that a little child could take it up by himself. My collection of plants gradually gave way to collections of shells and birds' eggs. Then came butterflies and beetles and finally the skeletons of small animals, like frogs and toads, mice and rats.

On one occasion my father presented me with a dead sucking pig, and the "distinguished professor of anatomy" was

ALEXANDER GRAHAM BELL AT THE AGE OF FIFTEEN

From an old photograph taken at his father's country home in the suburbs of Edinburgh.

called upon for a lecture. So a special meeting of "The Society for the Promotion of Fine Arts among Boys" was held in my study, the attic of my father's house (13 South Charlotte Street, Edinburgh). This was sacred to me, and there my collections presented an imposing array of anatomical specimens.

Some boards were arranged as seats for the members of the society. On a table in the middle lay the defunct sucking pig. It was a great moment when I started to thrust my knife into the abdomen of the subject for dissection. But, unfortunately, there happened to be some air in the creature, so that the knife thrust was followed by a rumbling sound that resembled a groan, with the result that we thought the creature alive.

Horror-stricken, I rushed from the room, followed by all the boys. We tumbled over one another in our eagerness to get downstairs. Each boy fled to his home, and none returned to hear the lecture. Even the lecturer himself was too frightened to revisit the lecture-hall. My father was obliged to go upstairs and take charge of the corpse; I never saw it again.

Urged by curiosity, I was very fond of opening the bodies of small animals to see what they were like inside. I had a large collection of little skeletons, nicely arranged and classified as in a museum. I also had a good collection of the skulls of the "higher mammalia" (squirrels and rabbits), even including the heads of "carnivora" (cats and dogs); but the gem of the whole collection was a real human skull, presented to me by my father.

I can see in these natural-history collections a preparation for scientific work. The collection of material involved the close observation of the likenesses and differences of objects of very similar kind, and the orderly arrangement, as in a museum, stimulated the formation of generalizations of various kinds.

My father encouraged me in making collections of all sorts and in arranging the specimens in accordance with my own ideas rather than in conformity with the ideas of others. I am inclined to think that the making of these collections formed an important part of my educa-

tion and was responsible for my early bent toward scientific pursuits.

LIFE WITH MY GRANDFATHER

However much I may have excelled in these exceptional pursuits, my grandfather made me speedily realize that I was grossly ignorant of the ordinary subjects of study that every school-boy should know. He made me ashamed of this ignorance and aroused in me the ambition to remedy my defects of education by personal study. He helped me to map out my time and devote certain hours to the ordinary school subjects. He also gave me personal lessons in elocution and English literature.

My grandfather was well known as a Shakespearean scholar and a public reader of Shakespeare's plays; so, of course, I had to make myself familiar with the plays of Shakespeare and commit to memory long passages from "Hamlet," "Macbeth," "Julius Cæsar," and "The Merchant of Venice."

MELVILLE BELL (BROTHER OF ALEXANDER GRAHAM BELL)

Colaborer in the construction of the automaton speaking-machine and joint trainer of the "talking dog" (see text, pages 235-239).

He also gave me instruction in the mechanism of speech and permitted me to be present at the instruction of some of his pupils, so that I might observe for myself his methods of correcting defective utterance.

This year with my grandfather converted me from an ignorant and careless boy into a rather studious youth, anxious to improve his educational standing by his own exertions and fit himself for college.

I have found it necessary to allude to my grandfather, and to his work in correcting defective utterance, not only on account of the influence he exerted upon my own life, but because the profession he founded became in process of time a family profession, which was handed down to his children and grandchildren. His two sons, for example, followed it.

His oldest son, David Charles Bell, of Dublin, Ireland (1817-1902), was an elocutionist and corrector of defective utterance. He was the father, by the way, of Mr. Charles J. Bell, of Washington, President of the American Security & Trust Co.

His other son, my father, Alexander Melville Bell, of Edinburgh, Scotland (1819-1905), was also an elocutionist and

ALEXANDER GRAHAM BELL'S FATHER, MOTHER, HIMSELF (ON THE LEFT), AND TWO BROTHERS, MELVILLE AND EDWARD, WHO DIED IN YOUNG MANHOOD

corrector of defective utterance. He, however, branched off in a new direction, as an inventor. He devised a remarkable system of symbols for depicting the actions of the vocal organs in uttering sounds. These symbols could be used in printed form, like letters of the alphabet. He claimed, indeed, that what he had really invented was a universal alphabet, capable of expressing the sounds of all languages in a single alphabet, and that his letters, instead of being arbitrary characters, were symbolic representations of the organs of speech and of the way in which they were put together in uttering sounds.

THE MELVILLE BELL SYMBOLS

For example, let me give you an illustration. The symbol for what we would call the letter M consisted of a curve forming the outline of a human lip, combined with another symbol meaning that the two lips were shut together. Then there was a third symbol, indicating the vibration of the vocal chords in forming voice; and still a fourth, showing that the soft palate was depressed so as to open the entrance into the nasal passages.

These four symbols were combined into a single character reminding one of some strange letter in a foreign language; but, unlike any such letter, it was not necessary for you to hear the sound in order to reproduce it.

The symbol could be analyzed into a direction to do something with the mouth, and if you followed the direction you uttered the sound, even though you had never heard it before.

The symbol for M could thus be translated into a direction to "shut your lips and pass voice through the nose." Now you will see, if you shut your lips and pass voice through the nose, you get one sound only, the sound of the letter M.

I remember my father giving a public lecture upon his system of Universal Alphabetics when I was a boy, and I acted as his assistant upon the occasion.

I was sent out of the hall, and then the members of the audience were invited to make any sorts of sound they desired, to be symbolized by my father. It was just as easy for him to spell the sound of a cough, or a sneeze, or a click to a horse, as a sound that formed an element of human speech.

Volunteers were called to the platform, where they uttered the most weird and uncanny noises, while my father studied their mouths and attempted to express in symbols the actions of the vocal organs he had observed.

I was then called in, and the symbols were presented to me to interpret; and I could read in each symbol a direction to do something with my mouth.

I remember upon one occasion the attempt to follow directions resulted in a curious rasping noise that was utterly unintelligible to me. The audience, however, at once responded with loud applause. They recognized it as an imitation of the noise of sawing wood, which had been given by an amateur ventriloquist as a test.

I remember another still more remarkable test. My father handed me a piece of paper with a very simple-looking sym-

bol upon it, and I was requested to utter the sound represented.

At first I thought it was simply the direction to pronounce the letter T, but soon noted a little diacritical mark attached to the symbol that had the technical meaning of "soft palate."

This I translated to mean that the point of the tongue, instead of being applied to the upper gum, as in the ordinary method of forming T, was to be coiled back in the mouth and placed against the soft palate—a thing I had never heard of or dreamed about before.

THREE GENERATIONS: ALEXANDER GRAHAM BELL ON THE LEFT, ALEXANDER MELVILLE BELL IN THE CENTER, AND ALEXANDER BELL ON RIGHT

I followed the direction, coiled my tongue backward, and tried to make a T-sound, with the point of the tongue against the soft palate. This resulted in a sound resembling both K and T, and the gentleman who had given the test expressed great satisfaction. He informed the audience that he was a professor of Hindustani, employed by the Indian Civil Service to teach young men Sanskrit and the languages of India. The sound he had given was the "Sanskrit cerebral T." He had been very unsuccessful, he said, in getting English students to master this sound and expressed surprise that Mr. Bell's son should have given it correctly at the very first trial, *without ever having heard the sound at all.*

Such incidents as these led my father to predict that persons who were born deaf might, through the use of his symbols, be taught to use their vocal organs and speak, instead of being limited in their means of communication to gestures, finger-spelling, or writing.

This was first tried in a private school for deaf children near London, conducted by Miss Susanna Hull, the great pioneer of oral teaching in England (who is still living). I went to Miss Hull's school to assist her in making the experiment, and was thus introduced to what proved to be my life-work—the teaching of speech to the deaf.

In connection with this work I took up the study of the nature of the vibrations going on in the air during the utterance of speech with the object of developing an apparatus that would enable my deaf pupils to see and recognize the forms of vibration characteristic of the various elements of speech. Various instruments were devised employing loaded stretched membranes, all based upon the well-known phonautograph of Leon Scott; and these experiments paved the way for the appearance of the first membrane telephone, the ancestor of all the telephones of today.

It will thus be seen that the work of my father had a great and important influence in fitting me to grapple with the problems of the telephone. Nor should I neglect to include the influence of the important men with whom I was thrown into contact through my father's work. My father was personally acquainted with most of the men who were prominent in these lines of enquiry, and of course I, as I grew up, came to know them, too.

I recall at the present moment Alexander J. Ellis, the translator of Helmholtz; Max Muller, the Sanskrit scholar, professor of modern languages at Oxford University; Henry Sweet, the phonetician; Dr. Furnival, the secretary of the

Photograph by William Reid

EDINBURGH CASTLE FROM PRINCES STREET GARDENS: EDINBURGH, SCOTLAND

It was in the shadow of this historic pile that Alexander Graham Bell spent his boyhood—the period during which he began the experiments which led up to his scientific achievements of later years and which he characterizes as "Prehistoric Telephone Days."

Photograph by Gilbert Grosvenor

THE ROYAL HIGH SCHOOL IN EDINBURGH WHICH ALEXANDER GRAHAM BELL ATTENDED AS A BOY

Philological Society of London; Dr. Murray, afterwards Sir James Murray, the editor of the great Oxford Dictionary; Prince Lucien Bonaparte, student of Scottish dialects; and Sir Charles Wheatstone, who is often credited, in England, with the invention of the electric telegraph.

When quite a lad I came into personal contact with these and many other prominent men. Ellis, Sweet, Furnival, and Murray I came to know very well; but most of the others I merely met casually during the course of interviews with my father.

SIR JAMES MURRAY

With Dr. Murray especially I became well acquainted. He was a profound student of phonetics and quite familiar with the Melville Bell Symbols, and he made my father's classification of speech sounds the basis of his method of noting pronunciation in the Oxford Dictionary, the "permanent standard," to which the characters employed in the dictionary should be referred in order to fix their pronunciation.

Dr. Murray was one of the kindest and gentlest men I ever met. He early won my deepest respect and esteem and even affection, and I gratefully acknowledge the kindly influence he exerted over me as a young man. In process of time we became quite intimate, and he did me the honor of selecting me to be best man at his wedding.

ALEXANDER J. ELLIS

To Alexander J. Ellis I owed my first knowledge of the researches of Helmholtz.

Photograph from Underwood & Underwood

DR. BELL RECEIVING THE FREEDOM OF HIS NATIVE CITY UPON THE OCCASION OF HIS RETURN ON A VISIT FIFTY YEARS AFTER MAKING HIS HOME IN AMERICA

The inventor is holding in his hands the silver cylinder containing the certificate presented to him by Lord Provost Chesser (at the right) symbolizing Edinburgh's open door to her distinguished son.

At the age of 18 years I communicated to Mr. Ellis my discovery that in uttering the vowel elements of speech faint musical tones could be heard accompanying the sound of the voice.

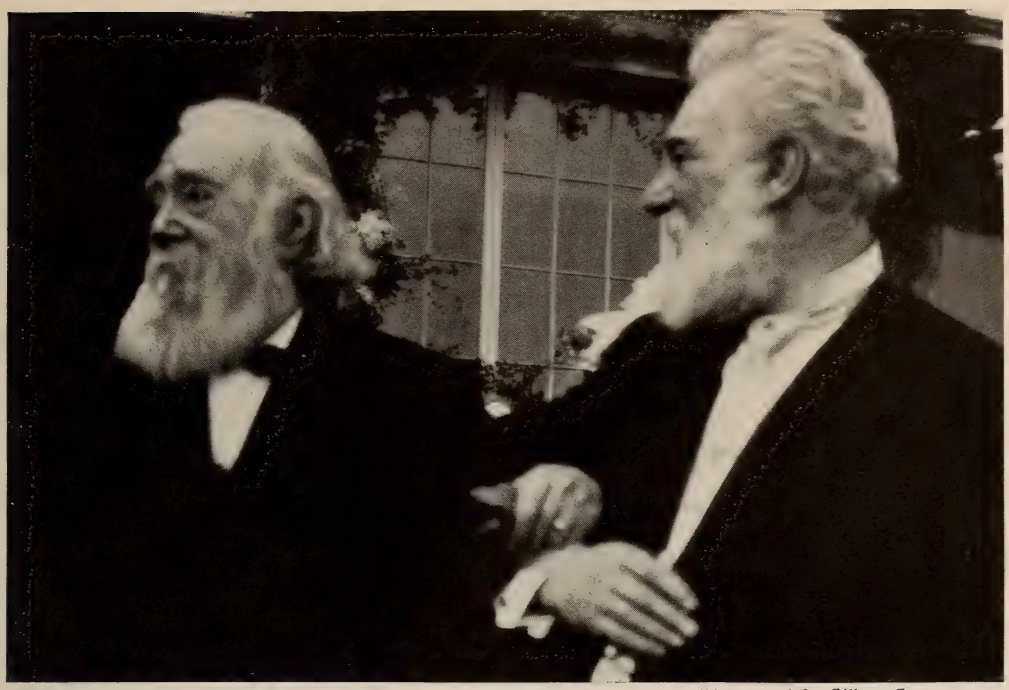
These feeble tones seemed to be characteristic of the different vowels, and had the same pitches as the resonance tones of the various cavities formed in the mouth when the vowel positions were silently assumed and the resonance tones brought out by tapping against a pencil held against the cheek or throat.

Mr. Ellis expressed great interest, but informed me that I had been anticipated by Helmholtz, who had not only analyzed vowel sounds into their constituent musical elements, but had actually produced vowel sounds by a synthetical process, by combining musical tones of the required pitches and relative intensities. He had produced these musical tones by means of tuning-forks which were kept in vibration by an electrical current, and had controlled the relative intensities by resonators applied to the forks.

At this time I knew nothing whatever about electricity, and found myself quite unable to understand, from Mr. Ellis' explanation, how tuning-forks could be made to vibrate by an electrical current.

Helmholtz' work had not then been translated into French or English and I was unable to read it in the original German. I therefore took up the study of electricity, and began to experiment with electrical apparatus in the hope that I might ultimately be able to construct Helmholtz' vowel apparatus and repeat his experiments.

When at last, after my arrival in America, I succeeded in vibrating tuning-forks, and tuned plates and reeds by electrical means, I made a number of electrical inventions based upon the utilization of musical notes as telegraphic signals;



Photograph by Gilbert Grosvenor

FATHER AND SON: ALEXANDER MELVILLE BELL (1819-1905) AND ALEXANDER GRAHAM BELL IN 1905

and these led gradually to the invention of the telephone itself.

But I need not enlarge upon this subject here, as you are already familiar with the development of the telephonic art, and I wish to confine my remarks as much as possible to boyish incidents, with which you may not be familiar.

PRINCE LUCIEN BONAPARTE

Prince Lucien Bonaparte was a distinguished scientific man, residing, I believe, in London, who made personal tours of Scotland, mapping out the geographical boundaries of the various Scottish dialects. As my father was a recognized authority upon dialects, the Prince invited him to dinner to talk over the subject, and I also was included in the invitation. I was only a boy at the time, but old enough to be duly impressed with the distinguished honor of dining with a real live prince.

I did not understand very much of the subjects of conversation, and was more impressed, I think, by the dignity and elegance of the three waiters, who stood at attention behind our three chairs. One put a plate with something on it right in front of me, and I was especially interested in the mysterious appearance of a hand the moment I let my knife or fork rest on my plate, followed by the sudden disappearance of the plate and the arrival of another.

I am afraid I was much more interested in this strange phenomenon than in the discussions that were going on between my father and the Prince. I amused myself, however, by counting the number of courses until finally I lost count. My boyhood recollection was that there were over twenty courses, but I am a little more doubtful about that now.

SIR CHARLES WHEATSTONE

I was also quite young when I had the opportunity of meeting Sir Charles Wheatstone. The interview at which I was present had nothing to do with electricity or the electric telegraph, but related to a very different subject altogether.

You have probably all heard of the celebrated automaton chess-player of the Baron von Kempelen, which appeared in

Photograph by Charles Martin

DR. AND MRS. BELL AND SOME OF THEIR GRANDCHILDREN AND FRIENDS: CAPE BRETON ISLAND, NOVA SCOTIA

the eighteenth century and startled all Europe by beating the most celebrated chess-players on the Continent. The story has come down to us that a dwarf was concealed in the apparatus, who guided the machinery and dictated the moves.

Many persons have imagined that the Baron's equally celebrated automaton speaking-machine, which was said to have uttered words and sentences in a childish voice, also constituted an imposition on the public; but, on the other hand, there were some grounds for believing that this might have been a real automaton after all, for the Baron von Kempelen published a book upon "The Mechanism of Human Speech," in which he gave a full description of his speaking-machine, with copious illustrations.

A copy of this book fell into the hands of Sir Charles Wheatstone, and he tested the matter by reconstructing the apparatus from the description and diagrams. My father heard of this and made an appointment with Wheatstone to see the machine and hear it talk; and he took me with him. I was too young to take any part in the conversation that ensued, but

I was a silent and interested observer of all that went on.

I saw Sir Charles manipulate the machine, and heard it speak; and although the articulation was disappointingly crude, it made a great impression upon my mind. Sir Charles very kindly loaned my father the Baron von Kempelen's book, and I devoured it when we reached home. It was in French, but I knew enough of French to be able, with my father's assistance, to read and enjoy the book.

MAKING A TALKING-MACHINE

Stimulated by my father, my brother Melville and I attempted to construct an automaton speaking-machine of our own. We divided up the work between us, his special part consisting of the larynx and vocal chords, to be operated by the wind chest of a parlor organ, while I undertook the mouth and tongue.

My brother and I were very much alike in our tastes and pursuits and even in our personal appearance. We were both fond of making little mechanical devices of various kinds, but we differed in our ability to construct them.

Melville was quite skillful in the use of tools and very neat-handed in everything he did. I, on the other hand, was always clumsy in the use of my hands and inefficient where tools were concerned. I hit upon a plan, however, that obviated the disadvantages of this defect in a great degree: I made my models of *gutta-percha* wherever possible.

This is an admirable substance to bring to a boy's attention. Gutta-percha becomes quite soft in warm water, and if you are careful to keep the hands wet, to avoid sticking, you can mold it into any form desired. Upon cooling, it becomes quite hard and firm. Then, again, you can give it quite a fine finish by smoothing the surface with a hot knife.

A pencil of gutta-percha can be handled like a stick of sealing wax, and can be melted or set on fire over the flame of a candle. The melted drops are quite sticky and adhere to any dry object with the firmness of glue. I used the material in place of glue. For example, in fastening pieces of wood together, I simply rubbed the adjoining surfaces with the melted end of a stick of gutta-percha and pressed them together. At once they adhered with sufficient firmness to avoid the necessity of using tacks, nails, or screws. The joint was quite firm the moment the gutta-percha cooled.

AN ATTEMPT TO COPY NATURE

My father took an extraordinary interest in the proposed talking-machine and encouraged us in every way. I now realize, as I could not then, that he looked upon the machine as a valuable educational toy, which would compel us to become familiar with the operation of the vocal organs, quite independently of any practical results attained. This accounts for the fact that he did not encourage us to follow in the footsteps of Kempelen and Wheatstone, but rather sought to have us copy Nature herself.

In accordance with his advice, we attempted to make an exact copy of the vocal organs, and work the artificial lips, tongue, and soft palate by means of levers controlled by a key-board.

I started out with my part of the work by making a cast from a human skull, and then from this mold produced a replica of the mouth parts of the skull in gutta-percha. This gave us a firm foundation on which to build, consisting of the upper teeth, the upper gum, the hard palate, and the back of the pharynx, with a large hole at the top representing the rear entrance into the nasal cavities.

This hole was covered by a valve, consisting of a piece of wood hinged to the palate and covered with a skin of soft rubber stuffed with cotton batting. The lever to operate it passed through the nasal passages beyond the nose.

The lips were formed of a framework of iron wire covered with rubber stuffed with cotton batting, and rubber cheeks were provided which completely closed in the mouth cavity.

A TONGUE OF WOOD DESIGNED

It was proposed to make the tongue of wooden sections, standing side by side like the dampers of a piano, each section to be pushed up into the mouth by its appropriate lever, the whole tongue to be covered over by a thin skin of rubber stuffed with cotton batting. This part of the apparatus was never actually completed, but sections of the tongue were made and experimented with.

Photograph by Gilbert Grosvenor

DR. AND MRS. BELL, THEIR TWO DAUGHTERS, AND THEIR GRANDCHILDREN, AT BADDECK, NOVA SCOTIA, IN THE SUMMER OF 1921

While I was working at this apparatus, my brother Melville succeeded in making an artificial larynx, or throat, of tin, with a flexible tube attached as windpipe.

Inside the larynx were two flat sheets of tin sloping upward toward one another, but not touching in the middle. They resembled the roof of a house with the ridge-pole removed.

Stretched tightly upon this structure were two sheets of rubber the edges of which touched one another in the space where the ridge-pole should be.

My brother found, upon blowing through the windpipe, that the rubber vocal chords were thrown into vibration, producing a musical sound. By varying the tension of the rubber strips and by varying the force of the breath, he could make the thing squeak like a Punch and Judy show, or produce a good, sonorous vibration like a reed musical instrument.

THE TALKING HEAD IS ASSEMBLED AND TRIED ON THE NEIGHBORS

When this stage had been reached we were, of course, anxious to put the throat and the mouth together to see what the effect would be. We could not wait for the completion of the tongue; we could not wait for the arrival of the organ bellows. My brother simply fastened his tin larynx to my gutta-percha mouth and blew through the windpipe provided.

At once the character of the sound was changed. It no longer resembled a reed musical instrument, but a human voice. Vowel quality, too, could be detected, and it really seemed as though some one were singing the vowel "ah."

I then closed and opened the rubber lips a number of times in succession, while my brother blew through the windpipe. The machine at once responded by uttering the syllables "ma-ma-ma-ma," etc., quite clearly and distinctly. By using only two syllables and prolonging the second, we obtained a quite startling reproduction of the word "mamma," pronounced in the British fashion, with the accent on the second syllable.

Well, of course, boys will be boys, and we determined to try the effect upon our neighbors.

My father's house in Edinburgh was one of a number of houses and flats that

opened upon a common stair. We took the apparatus out on the common stair and made it *yell!* My brother put the windpipe to his mouth and blew for all he was worth, while I manipulated the lips. Soon the stairway resounded with the most agonizing cries of "Mamma! Mamma! Mamma"! It really sounded like a little child in great distress calling for its mother.

Presently a door opened upstairs and we heard a lady exclaim, "My goodness, what's the matter with that baby"!

That was all that was necessary to complete our happiness. Delighted with our success, we stole quietly back into my father's house and gently shut the door, leaving the poor lady to make a fruitless search for the now silent child.

I do not think that the speaking-machine progressed very far beyond this point; but it had undoubtedly been successful in realizing my father's desire that through its means his boys should become thoroughly familiar with the actual instrument of speech and the functions of the various vocal organs.

In order to show the educational value of the apparatus, allow me to speak of some of the difficulties experienced in making the larynx. It was easy enough for my brother to copy the external appearance of the larynx, but we both found that our ideas concerning the interior arrangements were vague and extremely hazy. We were thus forced to consult books of reference and anatomical drawings, and we also examined a *papier-mâché* model of the human larynx.

KILLING A CAT IN THE INTERESTS OF SCIENCE

Even with these aids we were greatly puzzled by the appearance of the vocal chords. They did not at all resemble "cords" or tightly stretched strings, as we had imagined, and we felt that the only way of completely clarifying our ideas would be to examine the interior of a real larynx. This, however, involved a visit to a dissecting-room and the examination of a dead human body. We were only boys, and shrank with horror from the mere idea of attempting to do this.

We then remembered that we knew of an animal that produced sounds greatly resembling the human voice, especially at night, and wondered whether the throat might not resemble the human larynx we desired to see, so at last we determined to kill a cat in the interests of science. The only trouble was that we were much too tender-hearted to perform the operation ourselves.

We therefore sought the assistance of a friend, a young man who was a medical student and therefore presumably accustomed to deeds of blood. Would he not kill the cat for us, in the most approved and painless fashion and without injuring that precious organ the larynx.

He undertook the job, and so we caught a cat and carried it into my father's greenhouse at Trinity, near Edinburgh. My brother and I held the legs while the medical student forced open the mouth and quickly poured in a liquid warranted to send the cat to sleep. When I tell you that the liquid was nitric acid, you may imagine that that was not the result.

With a single bound the creature was out of our hands and rushing frantically round and round the greenhouse in the greatest agony. I shall never forget the thrill of horror that seized me, as I realized the condition of affairs. It was some time before the poor creature could be caught and put out of its misery; by which time we had completely lost our appetite for dissection. We quietly buried the cat and never even looked at the vocal organs.

It took us quite a long time to recover from the nervous shock of witnessing so terrible a death; but our medical friend—or, rather, fiend—merely laughed. He thought he had played a good joke upon us.

After this we were satisfied to obtain our knowledge of the larynx from a lamb's throat supplied by a butcher.

TEACHING A DOG TO SPEAK

I was always much interested in my father's examinations of the mouths of his elocutionary pupils. They differed in an extraordinary degree in size and shape, and yet all these variations seemed to be quite consistent with perfect speech. I then began to wonder whether there was anything in the mouth of a dog to prevent it from speaking, and commenced to make experiments with an intelligent Skye terrier we possessed.

Photograph by Gilbert Grosvenor

SUMMER HOME OF DR. ALEXANDER GRAHAM BELL: BEINN BHREAGH, NEAR BADDECK, NOVA SCOTIA

It is on this estate, overlooking the Bras d'Or Lakes, that Dr. Bell has pursued his eugenic experiments with twin-bearing ewes, and it is here also that he built the HD-4, the flying boat, which attains a speed of 70 miles an hour.

By the application of suitable doses of food material, the dog was soon taught to sit up on his hind legs and growl continuously while I manipulated his month, and stop growling when I took my hands away. I took his muzzle in my hands and opened and closed the jaws a number of times in succession. This resulted in the production of the syllables "ma-ma-ma-ma," etc., as in the case of the talking-machine.

The mouth proved to be too small to enable me to manipulate individual parts of the tongue, but upon pushing upward between the bones of the lower jaw, near the throat, I found it possible to completely close the passageway at the back of the mouth, and a succession of pushes of this character resulted in the syllables "ga-ga-ga-ga," etc.

The simple growl was an approximation of the vowel "ah," and this, followed by a gradual constriction and "rounding" of the labial orifice by the hand, became converted into the diphthong "ow," as in the word "how" (ah-oo), and we soon obtained the final element by itself—an imperfect "oo." The dog's repertoire of sounds finally consisted of the vowels "ah" and "oo," the diphthong "ow," and the syllables "ma" and "ga."

We then proceeded to manufacture words and sentences composed of these elements, and the dog's final linguistic accomplishment consisted in the production of the sentence "Ow-ah-oo-gamama," which, by the exercise of a little imagination, readily passed muster for "How are you, grandmamma" ("Ow-ah-oo-ga-mama")?

THE DOG TRIES IN VAIN TO TALK UNAIDED

The dog soon learned that his business in life was to growl while my hands were upon his mouth, and to stop growling the moment I took them away, and we both of us became quite expert in the production of the famous sentence, "How are you, grandmamma?"

The dog took quite a bread-and-butter interest in the experiments and often used to stand up on his hind legs and try to say this sentence by himself, but without manipulation was never able to do anything more than growl.

The fame of the dog soon spread among my father's friends, and people came from far and near to witness the performance. This is the only foundation for the newspaper stories that I had once succeeded in teaching a dog to speak.

MY FIRST INVENTION

I have often been asked whether I can recall the nature of my first invention and how I came to make it. So far as I can recollect, it came about in this way:

When I was quite a little fellow, it so happened that my father had a pupil of about my own age with whom I used to play. He was the son of a Mr. Herdman, who owned large flour mills near Edinburgh, and, of course, I went over to the mills pretty often to play with him there. We romped about and got into all sorts of mischief, until at last one day Mr. Herdman called us into his office for a very serious talk.

"Why can't you boys do something useful," he said, "instead of always getting into mischief?"

I mildly asked him to tell us some useful thing to do, and he replied by putting his arm into a bag and pulling out a handful of wheat. He showed us that the grains were covered with husks, and said: "If you could only take the husks off that wheat you'd be doing something useful indeed."

That made rather an impression upon my mind, and I began to think, "Why couldn't we take the husks off *by brushing the seeds with a nailbrush!*"

We tried the experiment and found it successful, although it involved a good deal of hard work from the two mischief-makers. We persevered, however, and soon had a nice little sample of cleaned wheat to show to Mr. Herdman. I then remembered that during our explorations at the mills we had come across a large vat or tank with a paddle-wheel arrangement in it that whirled round and round in a casing of quite rough material, brushes or fine wire netting, or something of that sort. If we could only put the wheat into that machine, I thought, the whirling of the paddle should cause the seeds to rub against the rough surface of the casing, and thus brush off the husks.

It was a proud day for us when we boys marched into Mr. Herdman's office, presented him with our sample of cleaned

Photograph by Charles Martin

THE BOARD OF TRUSTEES OF THE NATIONAL GEOGRAPHIC SOCIETY AT ITS MEETING DECEMBER 14, 1921, IN HUBBARD MEMORIAL HALL

Front row, reading from left to right: James Howard Gore, O. H. Tittmann, Alexander Graham Bell, William Howard Taft, Gilbert Grosvenor, Henry White, John Joy Edson, C. M. Chester, O. P. Austin.

Second row: David Fairchild, George Otis Smith, George Shiras, 3d, Rudolph Kauffmann, Charles J. Bell, Frederick V. Coville, George R. Putnam.

Top row: E. Lester Jones, Stephen T. Mather, T. L. Macdonald, Grant Squires, John Oliver La Gorce, George W. Hutchison.

(Absent because of illness: A. W. Greely, C. Hart Merriam, S. N. D. North.)

wheat, and suggested paddling wheat in the dried-out vat.

"Why," said Mr. Herdman, "that's quite a good idea," and he immediately ordered the experiment to be made. It was successful, and the process, I understand, or a substantially similar one, has been carried on at the mills ever since.

In 1876, about the time when the telephone became known to the world through the Centennial Exhibition, I had in my classes at the Boston University a Japanese student named Issawa. He afterwards became the Japanese Minister of Education in Formosa, and he is still living, I believe, as a member of the House of Peers.*

JAPANESE WAS THE FIRST FOREIGN LANGUAGE SPOKEN BY TELEPHONE

Mr. Issawa was studying with me the pronunciation of English and how the English sounds differed from the Japanese elements of speech. He knew of this curious instrument I had invented, and one day he fairly startled me with a question about it. "Mr. Bell," he said, taking the telephone up in his hand, "will this thing talk Japanese?"

He seemed much surprised when I assured him that it would talk any language, and he immediately proceeded to try it. He spoke into the transmitter while I listened at the receiver. I reported that the telephone was undoubtedly talking Japanese, but unfortunately I could neither speak nor understand the language myself.

He then asked whether he might bring two Japanese friends who were students at Harvard College. They came and soon satisfied themselves that the instrument could be used in Japan.

A great many years afterwards I was in Yokohama when the American residents there were entertaining a new Japanese minister who was about to start for Washington. I attended the banquet and was about to be presented to the minister, when he came forward and said that there was no necessity for introducing him to Mr. Bell, as he knew me years and years ago, when he was a student at Harvard College. He turned out to be one of Mr. Issawa's friends who had been present when Japanese was first used over the telephone.

This was the celebrated Baron Kurino, who was Japan's representative at Washington for some years and afterwards became Premier of Japan and represented his country during the peace negotiations at Portsmouth, New Hampshire, at the conclusion of the Russo-Japanese War.

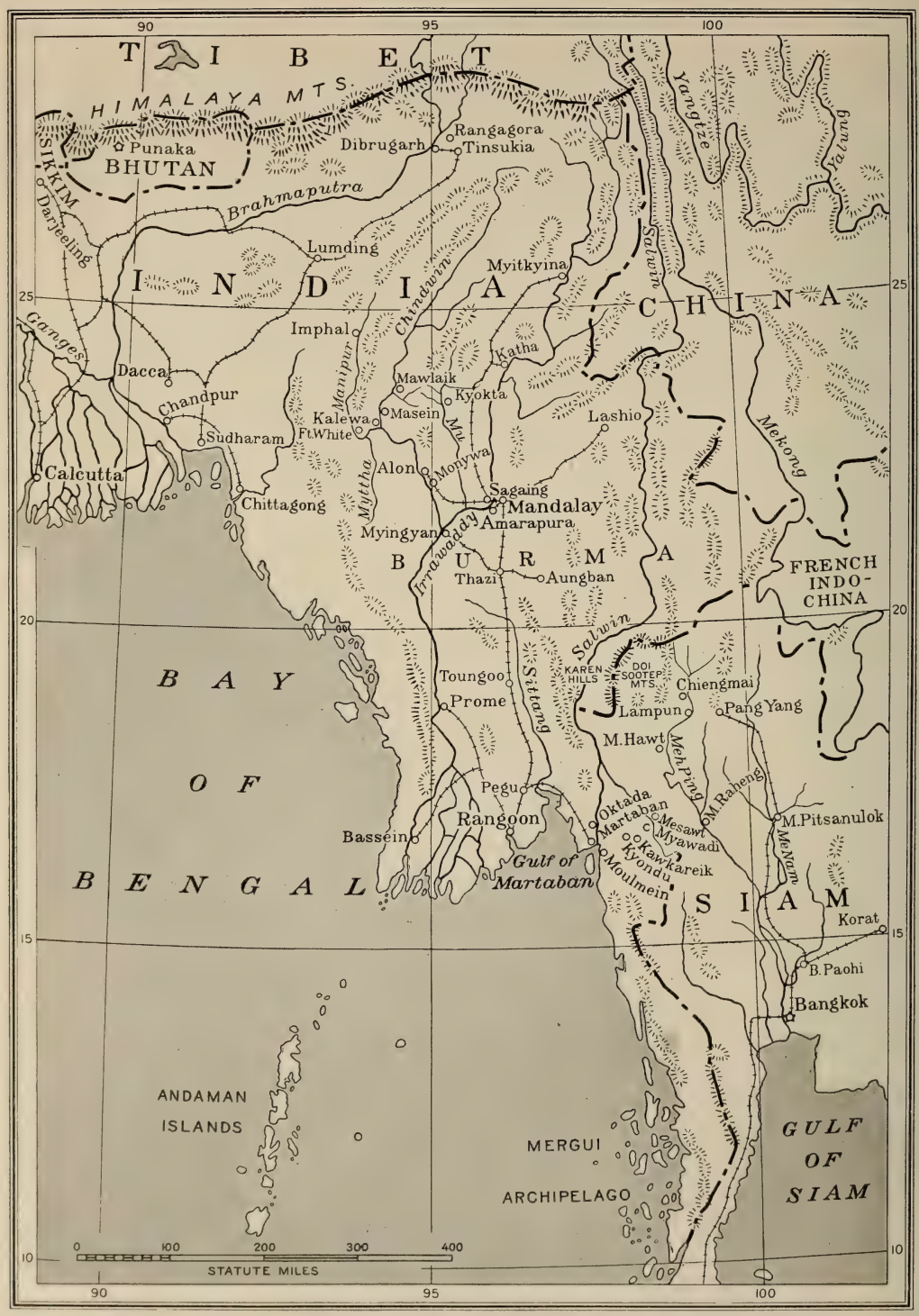
A few years ago a well-known Japanese gentleman visited the United States in a semi-official capacity to cultivate good relations between America and Japan. He gave a lecture before the National Geographic Society in Washington, and as I happened to be the President of the Society at the time, I entertained the distinguished visitor at dinner. This was Baron Kaneko, who is now, I believe, revisiting America on a similar mission.

The Baron in his after-dinner speech remarked that this was not the first time he had met Mr. Bell, for he was one of the two students from Harvard College who had spoken through the telephone in 1876.

It is rather interesting to know, not only that Japanese was the first foreign language spoken by telephone, but that the speakers were among the foremost men that Japan has produced.

The telephone has gone all over the world since then. It has grown far beyond my knowledge. The telephone system, as we now know it, is the product of many, many minds, to whom honor should be given for the wonderful and beneficial work it has accomplished. I can only say that I am proud and thankful of the fact that it was my crude telephone of 1874-75 that originated the great industry that we see today, and I hope that you have been interested in hearing something of its prehistoric days.

* A recent note from a cousin of Mr. Issawa informs me that he died a few years ago.—A. G. B.



Drawn by James M. Darley

A SKETCH MAP OF BURMA, HOME OF THE CHAULMOOGRA-OIL TREE

In his search for the tree whose fruit yields an oil which has proved a panacea for leprosy, Mr. J. F. Rock went first to Siam, entering that country by way of Singapore. He proceeded by rail to Bangkok, thence to Chiengmai and back to Korat, then to Chiengmai again, down the Meh Ping River to Raheng, across country by way of Mesawt, Kawkareik, and Kyondu to Moulmein, to Amarapura, Sagaing, and Monywa by rail, up the Chindwin River to Mawlaik, then eastward through forest and over mountain to Kyokta, where the seed were finally obtained. The Karen Hills, west of Chiengmai, are the home of the tribes described by Sir George Scott, pages 293 to 321 in this number of THE GEOGRAPHIC.

HUNTING THE CHAULMOOGRA TREE

By J. F. Rock

Agricultural Explorer of the Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry, U. S. Department of Agriculture

With Illustrations from Photographs by the Author

"CHAULMOOGRA" is no longer a strange-sounding name, for of late it has appeared frequently in newspaper dispatches as a possible cure for leprosy, and in fact two constituents of Chaulmoogra oil, chaulmoogric and hydnocarpic acids, but especially their ethyl esters, have proved efficacious in the treatment of that dreadful disease. These acids were first isolated and described and their esters prepared nearly twenty years ago by Dr. Frederick B. Power and his assistants.

From Hawaii came the message only two years ago that by means of intramuscular injections of the above-mentioned acids extraordinary results had been achieved. Since that time nearly two hundred lepers have been discharged from both the Kalihi Receiving Station in Honolulu and the main settlement at Kalaupapa, on the island of Molokai.

To be sure, the discharged patients are required to report frequently for reëxamination, but so far not one has had to be readmitted to the leper hospitals. Dr. A. L. Dean, of the University of Hawaii, prepared the two acids and their esters in large quantities for clinical use.

Chaulmoogra oil is obtained from the seeds of a tree known as *Taraktogenos Kurzii* King, named by Sir George King in honor of its discoverer, Kurz.

ASIANS HAVE USED THE OIL FOR CENTURIES

The natives of southeastern Asia have long known of the curative properties of Chaulmoogra seeds in skin diseases and especially in leprosy. In fact, they relate in their pre-Buddhistic legendary history that one of the Burmese kings exiled himself voluntarily and retired into the jungles, making a hollow tree his abode. Here he partook of the fruits and leaves of the Kalaw tree (*Taraktogenos Kurzii*), and in time his health was restored.

The oil of the Chaulmoogra seed has been employed by Asians for hundreds of years in a very primitive way, using it both externally and internally; but the latter method is exceedingly disagreeable, as the oil produces nausea and disturbs digestion.

Owing to the high price of the oil in the United States and the probable scarcity of it in the near future, due to its successful application in the treatment of leprosy in Hawaii, I was authorized by the U. S. Department of Agriculture to obtain seeds of this species, to be introduced into Hawaii and our tropical possessions, with a view to establishing Chaulmoogra plantations.

BANGKOK'S CHARM IS DUE TO ITS TEMPLES

The railway between Singapore, my port of debarkation in Asia, and Bangkok has been in operation for several years, and while the distance is only 1,018 miles, the journey takes five days. This is due to the fact that for much of the journey the trains run only during the day; the night must be spent in indifferent rest-houses.

The charm of Bangkok lies in its wonderful temples, of which the Royal Wats are the most gorgeous. The most interesting and historic of these wats is the king's own place of worship, Wat Phra Keo. A wall with battlements and ancient gates of queer design surround this and a number of other wats, including the old Royal Palace. Only the roofs of the temples and the graceful golden prachedis (votive spires) are visible from without, but their gorgeous colors permit the imagination to conjure a picture of even more gorgeous interiors (see pp. 246-250).

Through the courtesy of our American Minister, my host while in Bangkok, I was permitted by the Royal Siamese household to photograph the interiors of the various wats, even the most sacred Wat Phra Keo, with its Emerald Buddha.

The full name of Wat Phra Keo is Phra Sri Ratana Satsadaram. It was be-

A RESTING-PLACE UNDER A MIGHTY TREE IN THE FORESTS OF WESTERN SIAM

Note the gigantic vine which entwines the trunk

gun by Phra Puttha Yot Fa Chulalok "as a temple for the Emerald Buddha, the Palladium of the capital, for the glory of the king and as an especial work of royal piety," in the year 1785. It remained in an unfinished condition until the time of King Chulalongkorn, who made a vow on December 23, 1879, to complete the wat. It was during the celebration of the Siamese Centenary that the wat was dedicated, on April 21, 1882. All expenses connected with the completion of the wat were borne by the privy purse of the king and funds left by King Phra Nang Klao for that purpose.

To go into detail describing the glories of this wat would take many pages; suffice it to say that its tile roof is of Chinese yellow bordered with indigo blue; that the columns are mosaic and its heavy doors of carved wood. The center of interest is its sacred image, the "Emerald Buddha," a green jade figure which sits enthroned under many golden umbrellas, surrounded by praying devas (see page 247). The image was unearthed in 1436, at Kiang Hai, and brought to Bangkok, whence it was once stolen by invading Cambodians, but was recovered by a victorious Siamese army.

The mural decorations of the temple are exquisite. The floor is of tessellated brass, and the walls are covered with frescoes. Surrounding the gilded and carved altar are innumerable offerings which remind one very much of those found in old Christian churches renowned for miraculous healings.

Various buildings are included under the name Wat Phra Keo, such as the heavily gilded prachedi, the Sri Ratana, whose golden tiles were manufactured in Germany at the order of H. R. H. Krom Mun Aditson Udom Det. Weird guards watch before temple gates (see page 246); beautiful trees are artistically placed in Chinese pots, and Confucius and Laotse have places of honor.

KORAT, THE HOME OF THE MAIKRABAO TREE

One of the newest Bangkok temples is found not far from the royal audience hall and is known as Wat Benchama Bopit (see page 250). It is beautifully laid out and the grounds are planted with

AN AGRICULTURAL FAMILY OF LOWER SIAM

Note the prachedi-shaped bonnets worn by the children (see also illustration on page 263).

the Maikrabao, the Siamese tree, *Hydnocarpus anthelmintica,* which yields an oil similar to Chaulmoogra.

No one in Bangkok seemed to know where the Maikrabao was found in a wild state in Siam. It was left for the wife of the Viceroy of Chiengmai, in northern Siam, to inform me that it occurred plentifully in her native home, near Korat, in eastern Siam.

Wat Luang is the chief glory of Lampun (see page 251). Its votive spire has an outer casing of brass and is about 80 feet in height. The structure is surrounded by a brass railing and at the corners are small temples with stone figures. Before each of these guardian angels there stands a huge gilt umbrella.

The road from Lampun to Chiengmai leads through small villages and beautiful groves of Mai Yang trees (see page 259), which later give place to planted Rain or Monkeypod trees, as they are known in Hawaii.

A ROYAL GARDEN PARTY IN SIAM

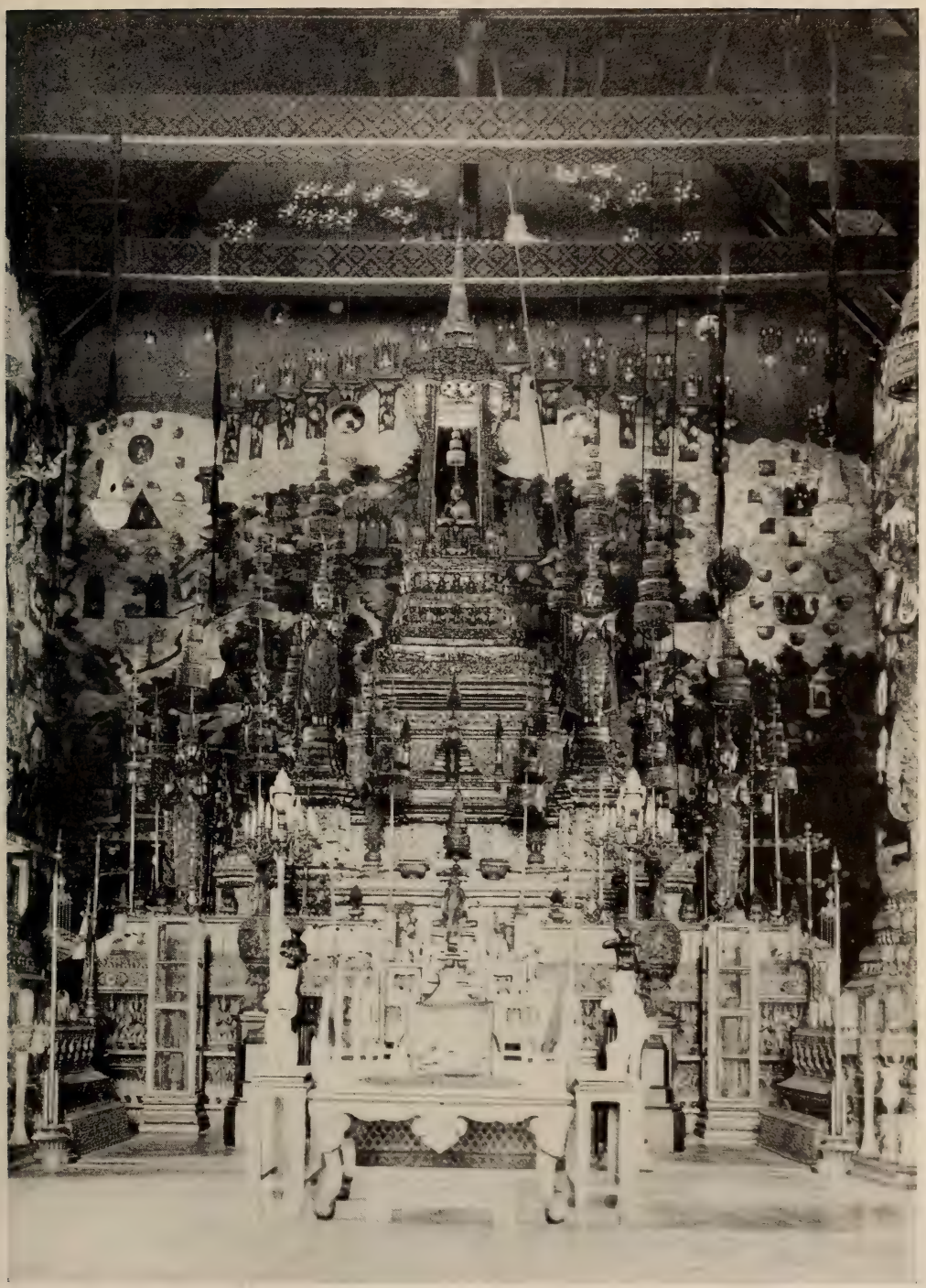
In Chiengmai, situated on the banks of the Meh Ping, "Giver of all Prosperity," we were cordially received by H. S. H. Bovaradej and his wife, the first lady of the Lao States.

Entertainment followed entertainment, the series culminating in a garden party on the lawn of the Viceroy's residence facing the Meh Ping, which then reached almost to the level of the road. It was a moonlight night, flags and lampions decorated the trees, and to the soft murmur of the peaceful waters of the river, on whose placid surface the moon was reflected, old Lao orchestras played weird chords which harmonized with the fantastic movements of strangely costumed Lao spear and sword dancers. These agile and graceful Lao ladies wielded long spears with great dexterity. A Siamese military band played strange and yet familiar airs at intervals, and it was long after midnight before this really royal entertainment came to a close.

Chiengmai boasts of some fourscore temples, of which the most important is Wat Luang (see page 256), which was built in 1881, on the same compound with the ruins of an earlier temple. In this city, as probably elsewhere in Siam, there is no "merit" in repairing a prachedi or wat; hence the numerous ruins and the

STRANGE GUARDS WATCH BEFORE THE SHRINES IN THE WAT PHRA KEO TEMPLE GROUNDS AT BANGKOK (SEE TEXT, PAGES 243-244)

Many buildings are included under the name of this temple. Among these is the heavily gilded prachedi (shrine), the Sri Ratana, whose golden tiles were manufactured in Germany by royal commission.



THE EMERALD BUDDHA, A BEAUTIFUL GREEN JADE FIGURE ENTHRONED UNDER GOLDEN UMBRELLAS AND SURROUNDED BY PRAYING DEVAS

This image in the Wat Phra Keo was unearthed at Kiang Hai nearly five centuries ago, and was borne to Bangkok, where it was once stolen by invading Cambodians, but was recovered by a victorious Siamese army (see text, page 244).

BANGKOK'S WAT PO, SHOWING THE HUGE PRACHEDIS COVERED WITH VARICOLORED PORCELAIN (SEE TEXT, PAGE 243)

The beautiful Buddhist temples give Bangkok a notable appearance. It is a modern city of half a million inhabitants. Until 1769 it was merely an agricultural village, but in that year it became the headquarters of Paya Tak, who drove out the Burmese and became King of Siam.

activity displayed in the erection of new temples.

Wat Phra Sing, second in importance, was built about a hundred years ago. The main building is now in such a dilapidated state that entrance to it is prohibited. Two leogryphs of brick and mortar guard the entrance to the grounds (see page 258), in which are several buildings besides the main wat. In the rear is a small wat in much better repair than the main building. The interior is decorated with frescoes, and the altar, on which three Buddhas are seated, is heavily gilded.

TEMPLE ROOF TILES REMOVED TO GET A PHOTOGRAPH

I took photographs of the mural frescoes, but, as the light was rather dull, the head priest of the temple, whom I photographed at the entrance near the white dragon (see page 253), suggested that a number of tiles should be removed from the roof to make the lighting effect more even. Whereupon a young priest climbed to the roof and removed a dozen tiles and I was enabled to photograph all the various panels, one representing the story of the God of the Magic Flute.

To the right of this building there is a less pretentious structure, where the priests take their vows (see page 258). We spied a long, narrow box in which was a roll about twenty-five feet long and fifteen feet wide, on which was painted the figure of a huge Buddha on a lotus flower. We were informed by our friendly priest that in times of severe drought this picture is taken to the top of Doi Sootep, a sacred mountain, where a magnificent wat was erected many years ago, and there, to the accompaniment of incantations, it is held on high by priests, and invariably rain descends to refresh man and beast and save the rice crops.

Very interesting are the libraries in every temple compound. They are the repository of Buddhist scriptures written by some devout hand with brass or iron stiles on the leaf segments of the Talipot palm. These palm-leaf scriptures are carefully wrapped, usually in yellow cotton cloth or silk, and placed in these libraries as a meritorious act. They are read only rarely and on special occasions. Like the temples, the libraries are rarely repaired (see page 256).

Chiengmai was founded more than 600 years ago. It soon gained in importance and attracted the attention of the Burmese and the Shans, who alternately conquered and sacked it.

THE RAILROAD IS REVIVING CHIENGMAI

A hundred years ago several princes, all brothers, came from Lakon, founded the last Lao dynasty, and raised Chiengmai to its former importance, which has greatly advanced under the wise rule and guidance of the Siamese Government.

The railway is soon to connect Chiengmai with Bangkok, and construction trains have already reached this north Siam outpost. When a regular service is established, within the next two or three years, the rich Meh Ping Valley will be opened for development. The forests of this region abound in teak, the logs of which are now floated down the Meh Ping River through gorges and over rapids which necessitate the employment of elephants to dislodge them from the rocks and banks of the river.

The north is rich and life is easy. Many claim that the railway, while a great blessing, will destroy the quaintness and charm of the city. It is as yet untrodden by tourists, for there are neither hotels nor boarding-houses, and the visitor is obliged to accept the generous hospitality of the American Mission.

DOI SOOTEP, CHIENGMAI'S SACRED MOUNTAIN

The chief point of interest in the vicinity of Chiengmai is Doi Sootep. It is reached by a splendid road, which leads through old gates to the ruined wall of the ancient city, with its moat filled with lotus flowers, and across rice fields covered with temple ruins, now the habitat of snakes and lizards and overgrown with trees and vines. We pass the only remaining glory of an ancient dynasty, numerous tombs of former Lao princes. Their ashes are buried under splendid monuments, of which the central and largest marks the spot where sleeps cruel Kowilarat, the last Lao king.

Next to Wat Suan Dork (literally, flower garden), as the mausoleum ground is called, is a temple sufficiently spared by the elements and time to bear witness to its former glory. Its gates of stone re-

BUDDHAS IN THE WAT BENCHAMA BOPIT: BANGKOK

These images, showing the Teacher of the Law and Middle Way in various attitudes, are the gifts of princes. The first image represents Gautama before he reached Buddha-hood, after his forty days of fasting (see text, page 244).

THE EMERALD BUDDHA TEMPLE, THE GLORY OF BANGKOK

This is the place of worship of Siam's king. The roofs are of Chinese imperial yellow tile bordered with indigo blue, while the pillars are of exquisite mosaic. The center of interest in this temple is the Emerald Buddha (see page 247).

THE PRIESTS OF LAMPUN AT THE BASE OF THEIR CITY'S CHIEF VOTIVE SPIRE (SEE TEXT, PAGE 245)

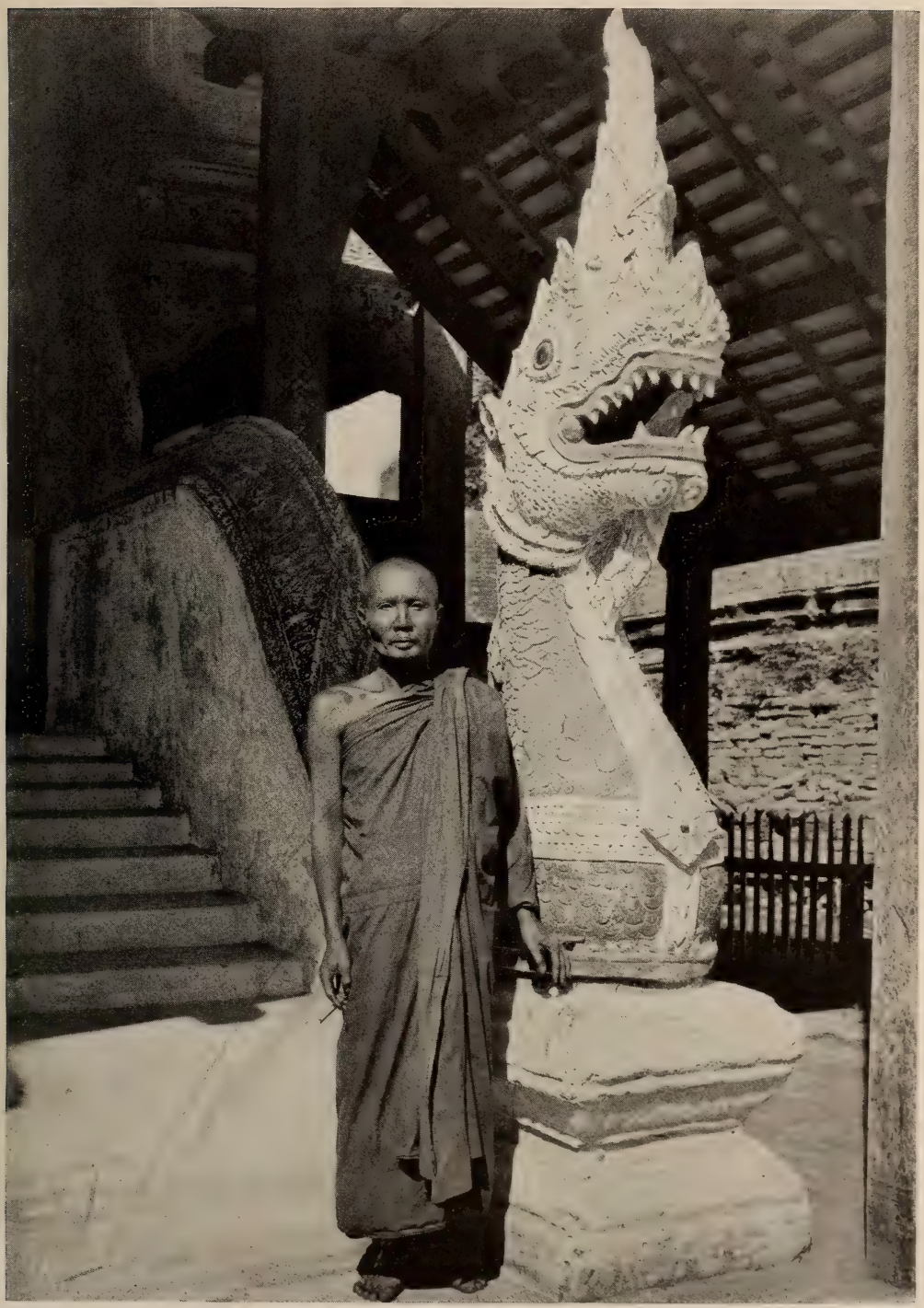
Wat Luang, which rises to a height of 80 feet, has an outer casing of brass. It is surrounded by a brass railing, at the corners of which are small temples with stone figures, before each of which stands a huge gilt umbrella.

SI LEAM, THE ORNATE FOUR-CORNERED PAGODA, ONE OF CHIENGMAI'S FOUR-SCORE TEMPLES

When the remaining 42 miles of the Bangkok-Chiengmai Railway are completed and a regular service is established, Chiengmai will be the center of the development of the rich Meh Ping Valley, whose forests abound in teak (see text, page 249).

THE INTERIOR OF WAT PHRA SING, THE SECOND TEMPLE OF IMPORTANCE IN CHIENGMAI (SEE TEXT, PAGE 249)

Unlike the famous cathedrals of the Western World whose beauty is only mellowed by the centuries, the temples of Siam soon fall into decay. This structure was built only a hundred years ago, but its entrance is so dilapidated that entrance to it is prohibited.



THE CHIEF PRIEST OF WAT PHRA SING STANDING BESIDE THE WHITE DRAGON OF HIS TEMPLE (SEE TEXT, PAGE 249)

A worshiper is often seen with a cigarette in his hand while he makes his supplication to Buddha, for the Siamese are inveterate smokers. The dilapidated temple buildings of Chiengmai in many cases are dens for snakes and lizards.

THE MARKET AT CHIENGMAI IN THE EARLY MORNING HOURS

Here, women are the only venders of the vegetables, curries, and fish which are the principal articles for sale. Chiengmai is the capital of the Lao States (see text, page 249).

mind one much of the famous Boro-Budur of Java.

The sun's rays descend mercilessly from an azure sky, and so we hurry on to Doi Sootep, where we are soon embraced by the cool shade of its majestic forests.

The ascent is at first steep and rocky. Gorgeous flowering crape myrtle trees border the trail, while higher up Dipterocarpaceæ, with mighty trunks and spreading crowns, give the landscape a bold aspect. Nature writes its story with a mighty hand, and orchids and graceful vines on the wayside are the commas and exclamation points of a harmonious composition. It would require a book of many pages to tell the story of the flora of this wonderful mountain.

Doi Sootep is really the name of a small mountain top crowned by a magnificent wat, which is visible from any place in the Meh Ping Valley. Lao Buddhists have always been great lovers of nature, and, like the great Kobo Daishi of Japan, who built his retreat and place of worship among the sacred pines, and Koyamakis of Koya San, they have retired to the sacred forests and hills to worship the teacher of the law and of the middle way.

LIVING COLUMNS OF PINE FORM THE TEMPLE'S APPROACH

What a glorious approach to this wat! No stone stairway lined by marble pillars or wayside shrines, but living columns of pines festooned and garlanded with sweet-scented orchids and vines, the steps covered with a living carpet of velvet moss; no organ played by human hands, but gentle breezes whispering in the trees and a chorus provided by feathered songsters whose

abode is in the mighty fronded canopy surrounding this hallowed spot.

Doi Chom Cheng is the summit of this mountain range where I camped under pines, oaks, and chestnuts. The chestnuts reach a height of seventy feet and their fruit is excellent. So far as I could determine, the trees have not been attacked by the chestnut blight, which has wrought so much havoc in the forests of our Eastern States. I had all the oaks collected, especially those of economic importance, and of course, all the chestnuts which I could possibly gather, for introduction into the United States.

I explored this mountain region as thoroughly as time permitted, but was handicapped by rain, which brought the leeches out and made walking through the forest very disagreeable.

As a result of my stay in Chiengmai and Doi Sootep, we have now growing in America several species of edible oaks and thousands of chestnut trees which will undoubtedly prove hardy in Florida and perhaps as far north as South Carolina.

THE SEARCH FOR THE CHAULMOOGRA TREE BEGINS

After a quick trip to Korat, where the Siamese Maikrabao tree (*Hydnocarpus anthelmintica*) was obtained, I returned to Chiengmai and chartered a house-boat for a journey down the tortuous Meh Ping River to Raheng, and thence overland to Moulmein, Burma (see map, page 242).

I left Chiengmai December 2, on a commodious house-boat manned by a Lao crew, an interpreter, a would-be cook and boy. Dr. McKean, superintendent of the leper settlement, who is doing a noble work, waved a last good-bye, and slowly we glided down placid waters, avoiding many river-boats anchored midstream near sand banks.

We spent the first of ten nights on this glorious river at Ta Sala.

The night was cold and the dew heavy, but the sky was starlit, although in the morning a heavy fog settled over the river, delaying our departure. At this point the river is wide and the flat banks are fringed with mighty bamboos and silk-cotton trees.

After several days' journey the scenery changed, and we entered mighty gorges, defiles, and forested mountains, which were here and there crowned by a wat or small Buddhist shrine glistening in the sunlight.

Many times during the day I would stop the boat (see page 266) and climb the mountains to explore the forests and collect plants. Legends are connected with many places along this river and one spot on a semi-barren mountain slope is pointed out to the traveler as the place where Buddha crossed this hill with a fighting cock, which scratched the surface of the ground to such an extent as to leave these places bare today.

Before reaching Muang Hawt, the largest village between Chiengmai and Ban Nar, we passed steep cliffs known as Pa Wing Choo. Here legend says that Princess Rata, escaping with her lover from her father, leaped over the mighty precipice on horseback. Their bodies were recovered at Muang En, and farther down various articles of the horse's equipment were found at the different rapids which have been named accordingly, as Pa Morn (Saddle found), etc.

The village of Muang Hawt consists of a single street with mud and bamboo houses, the inhabitants of which were lined up by the headman of the village to be photographed.

The river at this season being low, it was difficult to make a landing. We tarried only long enough to dispose of many bags of rice, the cause of our constant grounding on sand banks. Once I lost patience and, being in negligée, I quietly jumped overboard and swam ahead of the boat, expecting it to follow soon. Anxious calls from the captain urged me to return to the boat, quite a difficult matter against the current. The waters, I learned afterward, are said to be infested with crocodiles.

QUEER APPETITES OF A LAO CREW

After passing through the beautiful defile of Fa Man, with its wall of red rock, we approached the rapids (see page 265). Here we found a number of teak logs high and dry on a huge boulder in the middle of the stream, where they had been deposited by the receding waters. The scenery now became gorgeous. Steep walls covered with verdure and densely forested banks, on which bamboos of

THE CARVED TEAK-WOOD FACADE OF WAT LUANG, CHIENGMAI'S CHIEF TEMPLE

This sacred edifice was built only forty years ago on the site of an earlier temple (see text, page 245).

THE LIBRARY IN THE TEMPLE GROUNDS OF WAT LUANG: CHIENGMAI

Among the Siamese of Chiengmai the only merit in books is in their writing. The tomes are placed in libraries which might more properly be termed literary mausoleums, for the volumes are seldom, if ever, read (see text, page 249).

enormous height formed the main vegetation, glided past in review.

Rapid after rapid was negotiated, 41 in all, requiring two days. The first large one was Keng Soi, and the second Omlu, where the river made two wide curves, forming the letter "S." To my mind, this was the most dangerous of all. After passing the whirlpools we stopped and I went back, followed by my crew, to a few natives who had been fishing along this rapid. Instead of buying fresh fish, my men bought the oldest and rottenest they could find. This made further residence on my boat next to impossible, and I energetically demanded the removal of the offensive fish. They were eaten post haste.

At Okma, one of the last rapids, we met with difficulties that necessitated our being let over by means of ropes. At the first trial these broke, so that we narrowly escaped being dashed against the rocks.

ASHES OF ROASTED GIBBONS USED AS CONSUMPTION REMEDY

The only life observed along this tortuous river was an occasional bird with black-and-white plumage, at which the Lao boys dexterously shot with bow and pebbles. Here and there a gibbon ventured to the river bank, but not a single sambar did we observe, although they are common in this region. My interpreter informed me that the Lao and Siamese roast or burn gibbons, and the ashes are taken with liquor as a remedy for consumption. Everything is used—entrails, hair, and all.

Our next camp was near Pa Khar, where elephants kept me awake during the night. They were only breaking bamboo for food, but the noise resembled machine-gun fire.

Early in the morning I climbed the hillside to collect botanical specimens, but I was soon forced to retreat, owing to the unexpected appearance of a bear. The whole hillside is one solid mass of gray rock. A few hundred feet above the level of the river I found water-worn rocks, with deep, smooth holes, formed thousands of years ago by the waters of the Meh Ping. In these holes, trees (*Euphorbia antiquorum*) are now growing.

At Kaw Paw Luang we reached the last of the rapids. To the right was a huge rock, Doi Chung Da, with a cave of three entrances, each pointing in a different direction.

A fleeting visit was paid to (Kaw) Sam Gnow, "The Three Shadows," where an altar is hewn into the hillside some distance from the river. Here, in three niches, three Buddhas sit enthroned, in memory of three sacred shadows which appeared as an apparition to early navigators of the stream (see page 267).

Finally Raheng came into sight, and I parted from my cheerful Lao captain and crew, who had so faithfully and efficiently guided our boat through treacherous rapids.

The hardest part of the Siamese journey was now before me. With the help of the Assistant Governor of Raheng we completed our preparations and crossed the river, only to learn on the other side that we had more baggage than carriers, and so again we had to cross to the Borneo Company Compound to spend the night and wait for another contingent of coolies.

After reaching Raheng, we crossed glorious mountain ranges, covered with dense tropical forests of trees 150 or more feet in height, under whose protecting crowns we spent the nights. Sometimes we did not sleep with a sense of security, for these regions are inhabited by tigers, leopards, and snakes.

The scenery varied greatly. We traversed regions in which teak, strychnos, and cassia trees abounded; then we plunged through bamboo forests; then passed over mountain ranges covered with oaks, till finally we descended again into the plains, and after a journey of seven days reached Mesawt, a small town, the last Siamese hamlet, near a branch of the Salwin River.

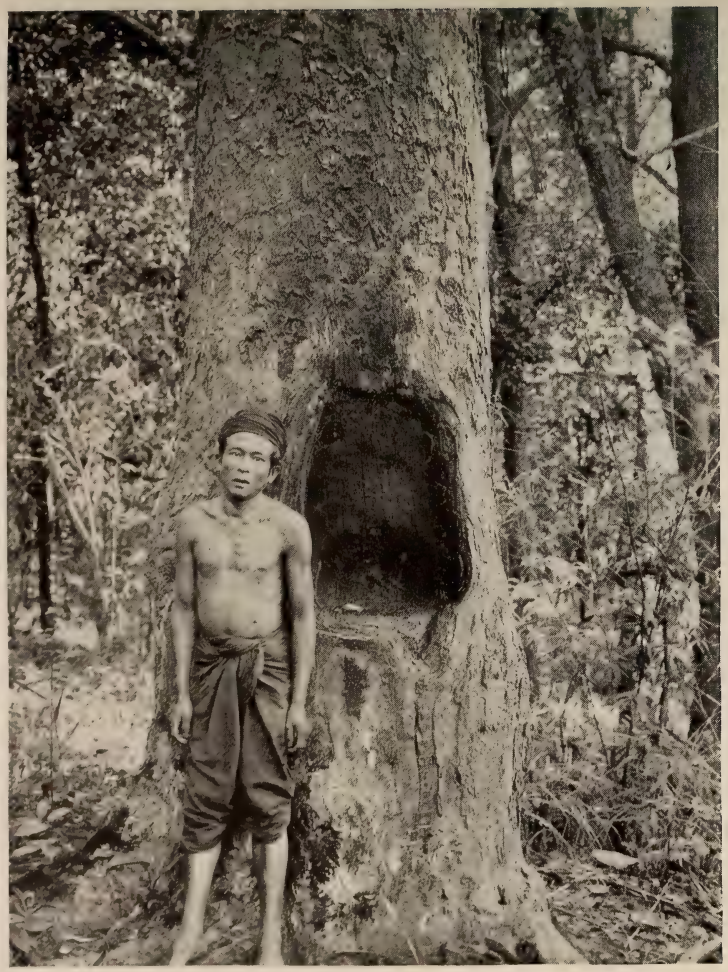
A COURT FOR THE TRIAL OF ELEPHANT THIEVES

When I called on the governor of Mesawt he was holding court for the trial of elephant thieves, who carry on a prosperous business near the border. The elephants are easily stolen, as they march very quietly, and once over the Burmese border are gone for good. Leaving his chained prisoners sitting on the floor, the magistrate accompanied me to the rest-

THE ELEPHANT VOTIVE SPIRE AND THE ENTRANCE TO THE GROUNDS OF WAT PHRA SING, IN CHIENGMAI

The Chiengmai temples are rarely repaired; hence vegetation runs riot over them after rains and winds have started their work of destruction. At the right is a portion of the building in which priests take their vows (see text, page 249).

The approach to the temple, which is in a bad state of repair, is guarded by two leogryphs of brick and mortar (see illustration to the left). Of the eighty temples of Chiengmai, this is second in importance only to Wat Luang.



THE TRUNK OF A MAI YANG TREE (SEE TEXT, PAGE 245)

The natives burn holes in these trees to collect a resin which they use in lamps. Nearly every Mai Yang tree is thus mutilated. The road from Lampun to Chiengmai runs through beautiful groves of these trees.

A FICUS TREE IN NORTHERN SIAM COVERED WITH FERNS

The northwestern slopes of Doi Sootep (see text, page 249) have a different climate from the slopes to the southeast. The former are clothed with tropical rain forests.

THE BUDDHA OF WAT DOI SOOTEP, OF BRICK STUCCO AND HEAVILY GILDED

The approach to the temple is through columns of pines festooned with orchids (see text, page 254).

WAT DOI SOOTEP, SITUATED ON A MOUNTAIN OF THAT NAME, 3,000 FEET IN HEIGHT

From this temple a glorious view is obtained over the Meh Ping Valley and the city of Chiengmai (see page 254).

A KARENI OF THE JUNGLE VILLAGE OF OKTADA, IN THE MARTABAN HILLS

This native of Burma holds in his hand some of the fruits of the Kalaw tree (*Hydnocarpus castanea*), similar to the true Chaulmoogra.

house where Siamese officials stop when en route from Raheng.

I decided to take to Burma the pony, which the Governor of Raheng had rented me, as the roads are very rocky and walking very uncomfortable. All my coolies, 24 in number, were paid off except two, my horseboy and my camera-bearer and treasurer, who carried all the heavy silver rupees. Neither paper nor nickel is negotiable in this part of the world.

For my heavy baggage and specimens I hired three bullock carts with Burmese drivers. These carts make from 18 to 20 miles a day.

After swimming a branch of the Salwin, traveling was more comfortable, as the British Government furnishes dak bungalows for the convenience of traveling officials and other Caucasian wayfarers.

THE FIRST GLIMPSE OF A CHAULMOOGRA-OIL TREE

Our path lay across the Kawkereik Hills, which are covered with glorious verdure, and it was in this region that I first encountered *Taraktogenos Kurzii*. Unfortunately, it was not in fruit. I was informed by a Burmese village quack that July is the month in which the Chaulmoogra fruits ripen. We hurried on and finally reached decadent but beautiful Moulmein on Christmas eve.

At first I deplored not having stopped for Christmas in the jungle! Yet in the end I was glad, for Christmas day was spent in the delightful company of our American missionaries at Moulmein.

They are doing a great work among the Burmese boys and girls and also among the lepers, though the institution for the latter leaves much to be desired.

My next point of venture was the Kalama range of the Martaban Hills, where the natives said Kalaw, or *Taraktogenos Kurzii*, could be found. So with interpreter, cook, and boy I started by train to Paung, on the road between Moulmein and Rangoon, and thence by bullock cart to the small Kareni village of Oktada.

To avoid mangy dogs and ticks, we made our camp under an old mango tree on the outskirts of the village, on the edge of the jungle, despite the fact that my companions swore that the woods were infested with tigers and other wild animals. I decided to sleep under the tree and my men arranged themselves around my cot.

The following day was devoted to ex-

ploring the hills. The mountains rise abruptly from the plain, are strewn with huge boulders, and are intersected by numerous rocky creeks on whose banks grows a species of *Hydnocarpus,* later identified as *H. castanea,* and called by the natives Kalaw, but it was not the long-sought-for *Taraktogenos Kurzii.* The seeds of these two trees are so similar that it would be impossible to tell them apart were it not for the double testa of the former.

IN THE HAUNTS OF TIGERS

I made a last trip into the hills of Oktada and found that Mr. Shwaloo, my interpreter, was correct as to the presence of tigers, for there were fresh tracks leading not far from our camp to the top of the ridge. Only a few hours before the big cat had stalked over the sandy trail to his haunts in the dense, low, bamboo forest, which we had to penetrate in a bent position in order to reach the Kalaw trees.

In all our rambles for three days we found only one tree with some 170 mature fruits, which I secured and the seeds of which I forwarded to America, where they are now growing. Although the seeds of this species have not been chemically examined, it is possible that they contain the same active constituents as the genuine Chaulmoogra.

Determined to secure *Taraktogenos Kurzii,* I left for Rangoon to inquire of the government forest office whether any of its staff knew where the tree could be found. The upper Chindwin District was said to be the home of the genuine Chaulmoogra tree. So I started once more with a Madrassi cook and a Mohammedan boy, this time by train, for Amarapura, where we crossed the Irrawaddy to Sagaing, and thence by train over a semi-desert region to dusty, dirty Monywa, on the upper Chindwin River.

MONYWA, TOWN OF DUST AND FLIES

Monywa, what a dreadful place! Dust, dust, dust, several feet deep, and the bullock carts conveying my luggage from the railway station to the *Shillong,* a trim stern-wheeler, were hardly visible in the alkaline clouds stirred up by clumsy feet. Kalaw seed is here sold in the bazaars, but I was told that it came down "from the north."

SHE'S RAISING HER SON TO BE AN ACTOR

This child, whose mother is a Siamese and whose father is a Chinese, wears the headgear of a Siamese Thespian (see also p. 245).

The bazaar is a living entomological collection. Never, not even in Egypt, have I seen flies so numerous. They cover the conical piles of brown sugar spread out on mats on the ground to such an

MOSQUITO TENTS USED BY BUDDHIST PRIESTS AS SLEEPING QUARTERS WHEN THEY TRAVEL IN NORTHERN SIAM

EXAMPLES OF THE METAL-WORK OF THE PEOPLE OF THE LAO STATES: SIAM

These Lao ladies, expert in the manufacture of silver bowls and baskets here displayed, are seated at the feet of the American Minister to Siam.

TEAK LOGS STRANDED ON A ROCK IN THE MEH PING, SHOWING THE HEIGHT THE RIVER ATTAINS IN THE RAINY SEASON (SEE TEXT, PAGE 255)

A LAO HOUSE-BOAT ANCHORED IN THE MEH PING

Here are seen the towering cliffs of red rock through which the river has cut its way at the defile known as Fa Man. The commodious craft on which the author traveled was manned by a Lao crew, an interpreter, a cook, and a boy (see text, page 255).

AWAITING THE RETURN OF THE EXPLORER FROM A TRIP INTO THE HILLS (SEE TEXT, PAGE 255)

The Lao captain of this house-boat on the Meh Ping waits patiently on the roof of his craft.

extent that almost every grain is moving, and this in the midst of squatting, betel-nut chewing, and expectorating women, surrounded by the mangiest fighting dogs, rotten tomatoes, cauliflower, cabbages, and cucurbits.

Early next day we left Monywa, and it was a comfort to be on a clean boat and on a picturesque river.

In the mornings we made little progress, due to fog which hovered over the river sometimes until 11 o'clock. The river was quite low at this season (January), and as the channel changes considerably, navigation is carried on with difficulty. We learned of one boat being aground somewhere up the river and we were to help it into deeper water, but unluckily we, too, became stranded on a sand bank. All the third-class passengers were promptly taken ashore in rowboats, and after an hour or so, when the boat was free, they were again brought on board.

What a scramble up the steep bank of the river, the level of which was then fifty feet lower than during the rainy season.

LIFE ON A BURMESE RIVER

Against the gray background of mud the gaily colored costumes of the Burmese men and women were wonderfully picturesque. There were deep purples, green, light blue, yellow, dark gray, and light pinks, with an occasional somber yellowish-brown denoting a shaven priest.

Many a peculiar craft passed the *Shillong*. A raft came floating down the river with people rowing at the four corners and a house in the center, with a flagstaff made of a living tree, from which fluttered a red and white pennant. Next we overtook a big house-boat poling up the river. It resembled a Chinese junk, about forty-five feet high at the stern, with a small bridge and a roof. There was one mast in front, the bow was forked and painted yellow, and it had a long bamboo cabin in the center.

We halted at Kalewa, a bazaar town prettily situated on an elevated tongue of land at the junction of the Myttha and the Chindwin. The one street runs along a ridge which culminates in a commanding eminence crowned with palms and pagodas. High peaks rise around Kalewa, whence starts the famous 60-mile Chinhill

SAM GNOW, OR THE THREE SHADOWS OF BUDDHA

This place of pilgrimage, near Raheng, on the Meh Ping River, is an altar hewn into the hillside. In three niches sit three Buddhas in memory of three sacred shadows which appeared as an apparition to early navigators of the stream (see text, page 257).

road to Fort White, which is garrisoned by Sepoys.

At length we arrived in Mawlaik, the new government seat of the upper Chindwin District, Kindat having been abandoned about three years previously, owing to malaria and unhealthy surroundings.

Mawlaik, newly laid out, possesses a circuit-house the like of which is found nowhere in Burma. It is a comfortable building with spacious verandas overlooking the Chindwin and the jungle on the opposite side of the river. The hospital, with its modern equipment, would be a credit to any American city.

Here I was informed that the Chaulmoogra forests were to be found several days' journey from Mawlaik.

Provided with a Burmese letter addressed to the tajees or headmen of the various jungle villages through which I was to pass, I started down the Chindwin in a dugout canoe.

CHAULMOOGRA TREES, BUT NO FRUIT!

After rowing for an hour through fog, I met a tajee in a boat coming upstream. We hailed him, and after seeing my magic letter he returned at once to his village, where he obtained peasants to carry my kit. A string of coolies, some twenty or more, mostly women with naked children on their hips and backs, and botanical blotters, a cot, or whatever they happened to pick out, balanced on their heads, marched through dale and over hill for the mere pittance of one anna (two cents or less) a mile.

After two days' marching through dense forest and crossing the Khodan

A MODERN STERN-WHEELER ON THE UPPER CHINDWIN RIVER (SEE MAP, PAGE 242)

This is the *Shillong,* which brought the author to Mawlaik, from which point he began his successful hunt for the Chaulmoogra trees in the jungles near haunted Kyokta.

stream many times, we reached Khoung Kyew. Here I found my first genuine Chaulmoogra tree, some miles distant from the village proper. Wild elephants live in herds in these jungles and often come to bathe in the stream in the daytime. First we entered a dense Dipterocarpus forest, then one of bamboo (*Cephalostachyum pergracile*), and finally we reached pure stands of the genuine Chaulmoogra tree, *Taraktogenos Kurzii* (see page 269); but, alas, no fruit!

The headman of the village informed me that there had been a very poor crop of seed here, but added that a village some miles farther had had a very good one the year before, and so I decided to proceed thither.

I sent my magic piece of paper ahead by special messenger, and when I arrived at Kyokta, the village in question, I found a bamboo mat spread in the village square near the Poongyi Khoung, or little pagoda, with an old and only chair in the center and the peasants sitting around the mat.

I made myself as comfortable as possible in my little camp on the edge of the jungle, for this village is surrounded on three sides by dense forest. The next day I started out with 36 coolies, determined to come back to camp loaded with Chaulmoogra seeds. We had five or six miles to walk, always following a dry creek bed through the dense forest. These creek beds are as flat as a floor, with no rocks visible. For miles there was only fine quartz sand, which made marching easy.

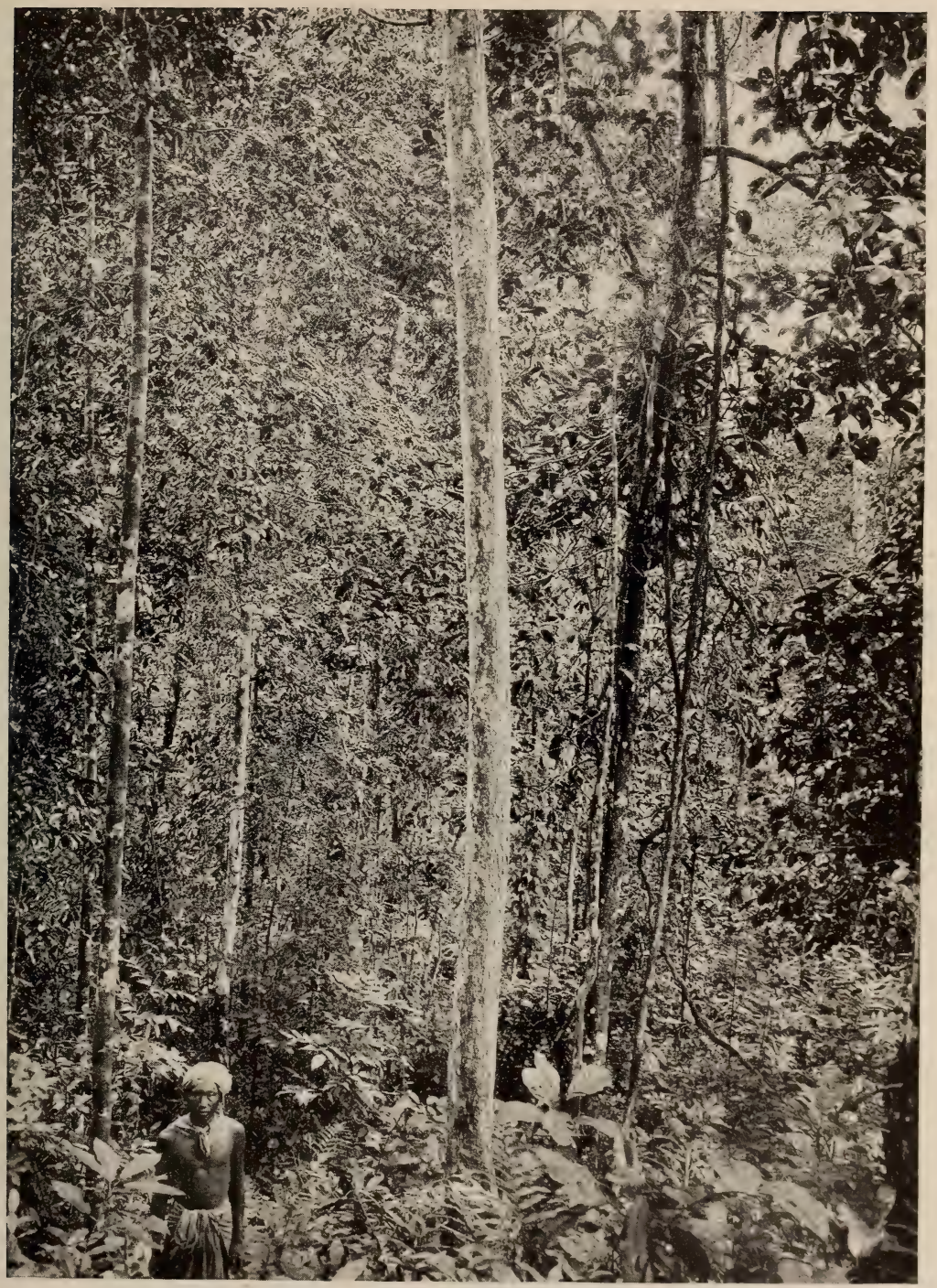
We passed through vegetation similar to that at Khoung Kyew until we struck the Chaulmoogra forests. There we separated into smaller parties and the seed-collecting began in earnest (see page 270).

While thus engaged we met a mother bear with her cub. With wild shouts from the natives she was driven off, leaving behind her young, which my Burmese coolies insisted on taking to the village.

THE LEPROSY-CURING SEED AT LAST

Loaded with seeds, we started down the steep hillsides, which are covered with Chaulmoogra trees, glad at heart that at last I had been successful.

When we reached the stream bed up which we had come a few hours previ-



PURE STANDS OF CHAULMOOGRA TREES NEAR THE JUNGLE VILLAGE OF KHOUNG KYEW: NORTHWESTERN BURMA

This forest is tenanted by wild elephants who often come to bathe in the Khodan stream in the daytime. At the time of the visit of the author, these trees were not in fruit, so he proceeded a few miles farther to Kyokta, where his search for the precious oil-bearing seeds was finally rewarded (see text, page 268).

IN THE MIDST OF A CHAULMOOGRA FOREST

Along a creek bed near the jungle village of Kyokta, in northwestern Burma (see text, page 268).

THE SOURCE OF THE PANACEA FOR LEPROSY

A fruiting branch of a genuine Chaulmoogra-oil tree pinned against the trunk of the tree itself.

SAVAGE FOOTPRINTS IN THE SANDS, PROOF THAT DEATH HAD STALKED THE SEED HUNTER

On his return from the Chaulmoogra forests to the creek bed which he had followed in the morning, the author found unmistakable signs that a tiger had stalked his party for several miles (see text, page 273).

THE VILLAGE PRIEST OF KYOKTA IN FRONT OF A PAGODA MADE OF SAND AND BRAIDED BAMBOO

During the night of the wild elephant attack and the capture of the tiger (see text, page 276), the author slept in the teak-wood temple, the safest place in the village.

THE TRAP BUILT FOR THE TIGER AND BAITED WITH ONE OF ITS HUMAN VICTIMS

The whole village of Kyokta worked with feverish haste to complete the trap before nightfall. The body of the woman was separated from the main trap by stout bamboo stakes (see text, page 276).

THE SLAYER SLAIN

Twenty spear thrusts ended the existence of this savage beast.

THE END OF A WOMAN EATER (SEE TEXT, PAGE 276)

The beast which had wrought such destruction was borne to the village square to be skinned.

ously, we found that a large tiger had followed us into the jungle, for there were its footprints so clear and distinct that I stopped and photographed them (see page 271). We had no arms with us; only a camera and quantities of Chaulmoogra seeds.

We reached the village safely, and I immediately began to pack my seeds in powdered charcoal and oil paper to prevent the moisture from escaping; for when allowed to dry out they lose their germinating power within a short time.

I had planned to begin the return journey to Mawlaik with my precious burden the next day; but I had reckoned without the tiger. Two of my coolies had a small rice field only a quarter of a mile distant, in the jungle, with a small hut in which their children and womenfolk slept and guarded their harvested grain. Instead of returning that evening to their hut, they remained in the village, leaving their womenfolk alone in the field.

THE TIGER TAKES TOLL OF THE PEASANTS

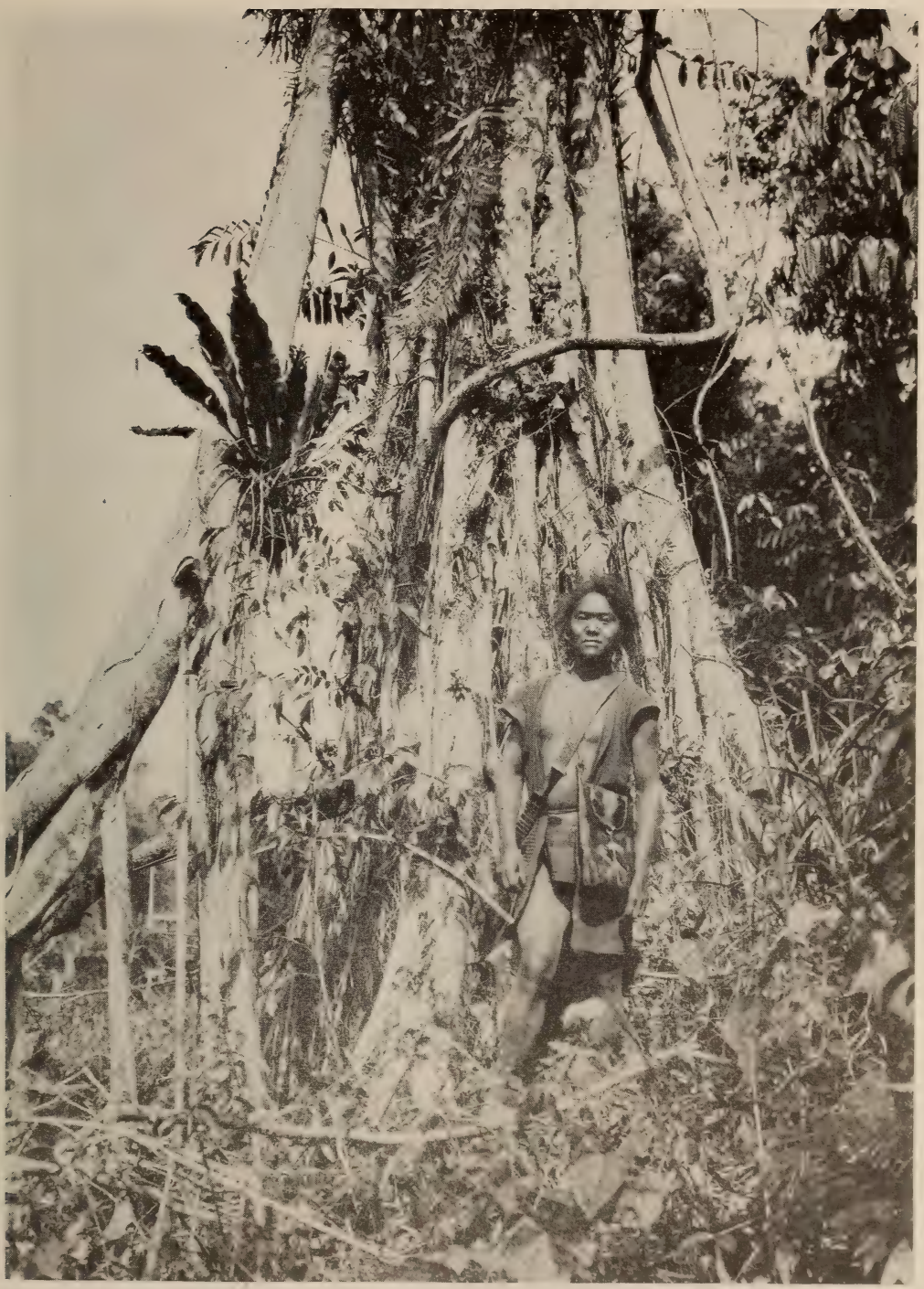
At 6 o'clock the next morning, as I was about to start and the coolies were ready to take their burdens, the tajee (headman) came to me with a very sad face and still sadder story, saying that a boy five years old had come from the outlying paddy-field, reporting that his mother had been killed by a tiger. The poor youngster was himself badly injured, showing the scars of five claws on his back and his left lower limb badly burned from a campfire into which the tiger had hurled him.

Great excitement ran through the village. The temple drums were beaten and the gongs sounded an alarm. All the male villagers armed themselves with spears and knives and, marching ahead of them, I went to the scene of a tragedy.

A dreadful spectacle awaited me. Into this lonesome place, wrested from the jungle, the tiger came at dawn to do its work of destruction. We found that, owing to the cold night, the women, living with two children, had constructed a hut of paddy or rice straw directly on the ground, with only one small opening. In this hut were three women, a two-year-old girl, and the five-year-old boy. When the tiger had entered the hut, there was no escape. Short work was made of the helpless victims.

MEMBERS OF THE JUNGLE TRIBE OF MISHMI, IN THE FORESTS OF NORTHERN ASSAM

After finding the Chaulmoogra trees in northern Burma, the author proceeded to Calcutta and thence to Dibrugarh, Assam, where Chaulmoogra trees were also found, as well as these interesting people.



A MISHMI IN THE DIBRU FOREST AT THE FOOT OF A HUGE FICUS TREE: ASSAM

The true Chaulmoogra-oil tree is found only as scattered individuals in Assam, growing in company with the *Gynocardia odorata*, a tree belonging to the same family and for more than a century thought to have been the source of Chaulmoogra oil.

One woman, about 25 years old, was lying about 100 yards away from the hut, whither she had been dragged by the brute, her face literally bitten out and her neck severed. The second woman was lying in the hut, a formless, gory mass, and the third lay in front of the hut, alive but with a ghastly face wound, her whole left cheek having been bitten out, exposing both jaws.

The little girl had disappeared. All we found was a trail of blood which led into the forest.

I had a litter of bamboo constructed, on which the injured woman was taken to the village, where I dressed her wounds.

BAITING A TIGER TRAP WITH A HUMAN VICTIM

But what was to be done about the tiger? We had no arms save a Colt automatic, so we decided to build a trap. I shall never forget how the poor husbands of the slain women worked on that trap. One had lost all his family—his wife, sister, and little daughter.

The whole village worked all afternoon constructing the trap, into which was placed for bait the body of the woman found in the field. She was separated from the main trap by strong bamboo stakes and her hands were tied with a string which was fastened to the drop-door of the entrance (see illustrations, page 272).

For safety the village priest invited me to spend the night in the little wooden temple at the feet of Buddha. To sleep was unthinkable. It began to rain, the thunder rolled, and weird lightning effects added height to the somber monarchs of the forest. Crash followed crash and—what! listen!—the trampling and trumpeting of elephants, wild cries and shouts of confusion!

I did not know till next morning what had happened. A herd of wild elephants ventured to the outskirts of this doomed village and made short work of the flimsy houses and rice barns. Like a cyclone, they swept over the place and, not satisfied with destroying the huts, devoured the recently harvested rice. The morning found the sky still weeping over all this tragedy.

But the tiger had been caught, and I was informed that the men were sitting around the trap waiting for me. I hurried to the scene, following the tiger's still visible imprints of the day before on the sandy banks of the stream. The captured creature's rage was terrible to behold. Only a few minutes and the brute was no more, for 20 spears ended its savage existence.

On opening the trap we found that the animal had severed the bamboo separating it from the body of its victim and devoured the latter—hair, head, and all—save a small portion of her back. We gathered the few remains and buried them in the rice field. The natives carried the tiger on two bamboo poles to the village (see page 273).

I left Kyokta that afternoon, in spite of rain and the advanced hour of the day. The forest looked still more somber and weird; the trip back was not a pleasant one, for we had with us the injured woman, whom we were taking to Mawlaik, where she died the day after our arrival.

The dearly bought Chaulmoogra seeds were shipped from Mawlaik to America, where they are now growing and ready to be transplanted.

THE DEMAND IS FAR GREATER THAN THE PRESENT-DAY SUPPLY

In conclusion, it may be stated that the ethyl esters manufactured in Hawaii are unfortunately only sufficient for treatment of lepers in Hawaii. In fact, there are several hundred patients in Hawaii still untreated. No help from Hawaii can be promised to lepers residing outside of that territory and no medicaments can be secured from the territory at present.

These leprosy specifics are now manufactured by several firms, but not in quantities large enough to supply the world. This can only be accomplished by growing the trees as a plantation crop.

Hawaii has taken the lead in the establishment of a Chaulmoogra plantation, but it must be remembered that it will be at least eight years before these trees produce fruit.

Photograph by Albert Steiner

A WINTER LANDSCAPE NEAR ST. MORITZ

"Nine months winter and three months cold" is the phrase the natives of the Upper Engadine region of Switzerland employ in describing their climate, which attracts summer tourists from June to September, and winter revelers from November to March.

Photograph by Albert Steiner

WHEN WINTER DECORATES THE ALPINE SLOPES NEAR CAMPFÈR

Campfèr is situated at the mouth of the Suvretta Valley and commands a superb view of the Upper Engadine. In this part of Switzerland the mountains are wooded to a height of more than 7,000 feet.

Photograph by Albert Steiner

SPRING'S CARPET SPREAD AT THE FEET OF PEAKS MANTLED IN PERPETUAL SNOW

The region in the vicinity of Arosa, one of the highest winter and summer resorts in Switzerland, is noted for its Alpine flora. It is situated at the head of the Plessur Valley, in a sheltered upland basin.

Photograph by Albert Steiner

ST. MORITZ AGAINST A FROZEN BACKGROUND

This, the highest village in the Engadine, was a pilgrim resort five centuries ago; today it is far from being a religious center, for here the care-free of Europe gather to frolic the winter away.

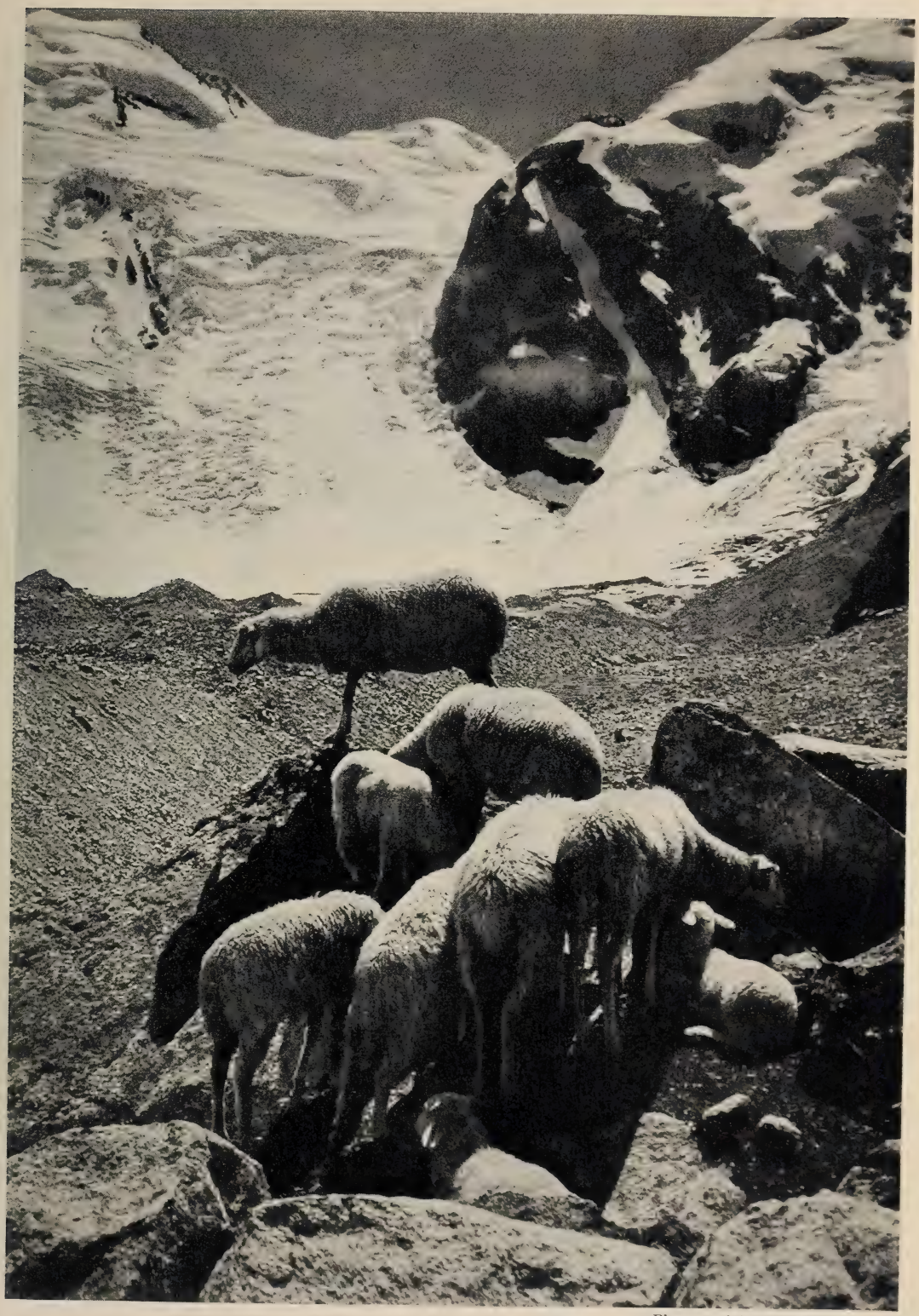
Photograph by Albert Steiner

SLED RACING ON THE LAKE OF ST. MORITZ

Skating, curling, tobogganing, ski-ing, and bandy (hockey upon skates) are among the diversions which attract thousands to this lake when ice converts it into a vast arena for winter sports.

Photograph by Albert Steiner

SNOW AND SHADOW COLLABORATE TO PRODUCE A PICTURE



Photograph by Albert Steiner

PEACEFUL PASTURAGE UNDER THE SHELTER OF THE BERNINA MOUNTAINS

Photograph by Albert Steiner

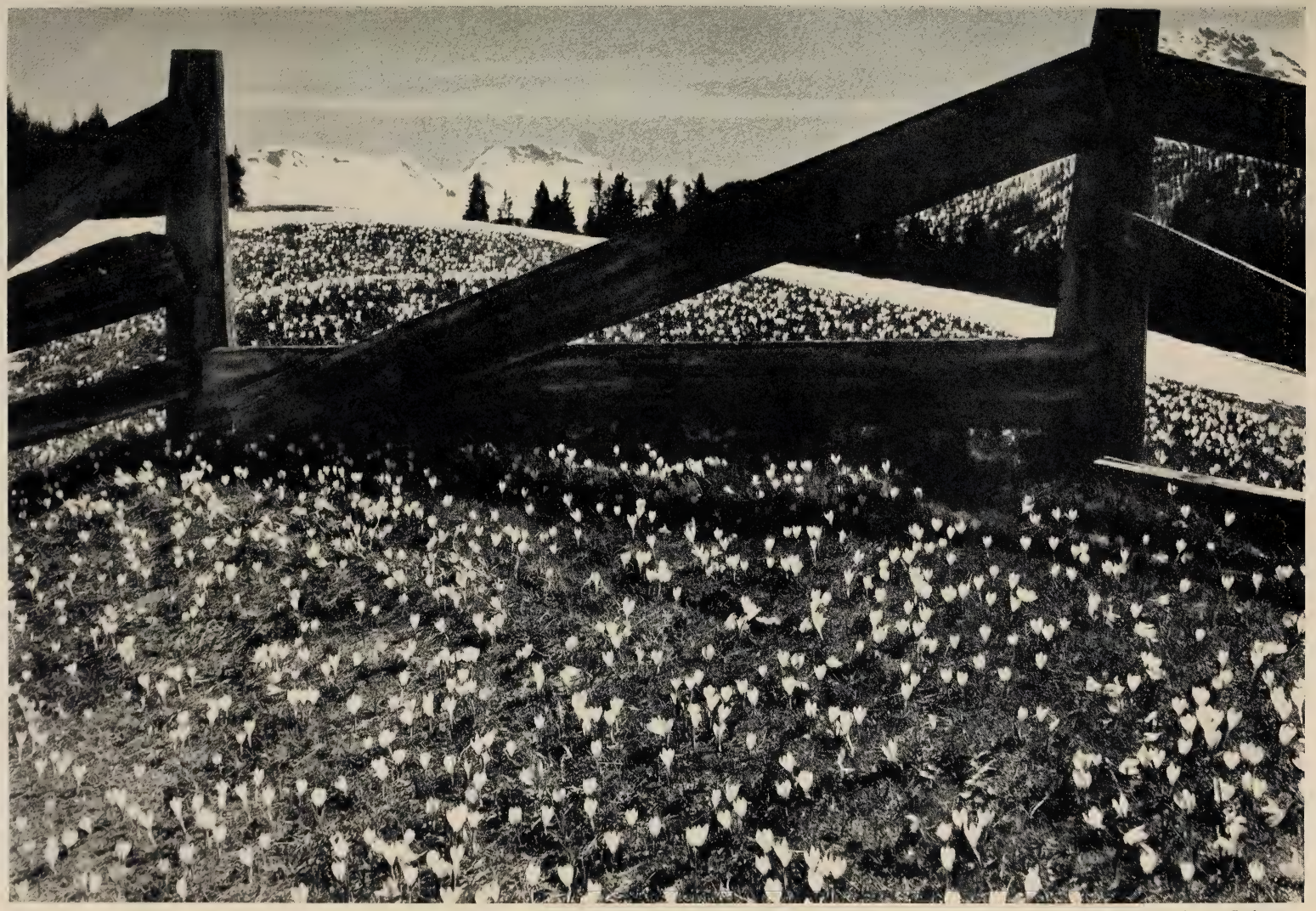
WINTER DAWN UPON THE HEIGHTS

Photograph by Albert Steiner

VESPER HOUR IN THE VALLEY

Photograph by Albert Steiner

MATCHLESS FILIGREE WROUGHT BY THE WIZARDRY OF FROST



Photograph by Albert Steiner

FIRST DAYS OF SPRING IN THE CANTON OF THE GRISONS

Photograph by Albert Steiner

THE RHAETIAN RAILROAD CROSSES THE WILD GORGE OF THE LANDWASSER ON STONE STILTS

Photograph by Albert Steiner

SURVEYING THE PAGEANT OF THE SUNSET FROM AN ALPINE SUMMIT

Photograph by Albert Steiner

EVENING SHADOWS IN A VALLEY OF THE LOWER ENGADINE

Photograph by Albert Steiner

THE WOODED SLOPES OF THE VAL BREGAGLIA

Photograph by Albert Steiner

THE ARRIVAL OF AUTUMN ON LAKE ST. MORITZ

AMONG THE HILL TRIBES OF BURMA—AN ETHNOLOGICAL THICKET

By Sir George Scott, K. C. I. E.

Formerly British Commissioner, Anglo-Siamese and Burma-China Boundary Commissions, and Superintendent and Political Officer, Southern Shan States

With Illustrations from Photographs by the Author

ABOUT half-way up the railway from Rangoon to Mandalay, roughly in the nineteenth parallel of north latitude, one gets the first glimpse of the range of hills which wall in the plain of Burma on the east. Toungoo, which the purists will tell you should be written Taung-ngu (that is, the Spur of the Hill), is the station on the time-table where the hill line begins to be noticeable. It is the edge of the Shan plateau (see map, page 242).

Geologists call it a plateau, but the average man would call it a Brobdingnagian nutmeg-grater or a stupendous plowed field. The spurs, which the east end of the Himalayas throw out, fade into the plain here like the edge of a beam from a search-light, and continue to do so far away to the east, across Siam, Tongking, and China.

From the train the hills do not look very formidable, but they are heavily covered with jungle, there is practically only one road from the west into the Karen country, and it is only those who are accustomed to hill roads on the borders of China who would call it a road. Others might call it a variety of things, none complimentary.

But it is this inaccessibility which has preserved through the centuries a collection of tribes such as is to be found nowhere else on the earth, at any rate in so circumscribed an area.

The Karen Hills do not measure much over sixty or seventy miles from north to south, and average, perhaps, thirty miles wide, but they have several score different clans and tribes and all these look upon their neighbors with the same suspicion and animosity as the pariah dogs of one quarter of an oriental city have for those of any other quarter.

To get to these Karen Hills it would be very unwise to make straight for them from Toungoo, or any other point on the railway. There is indeed quite a creditable path to the headquarters of the American Baptist Mission to the Karens. But unfortunately this is hardly beyond the foothills, and the really interesting tribes are beyond.

THE OPIUM TRADERS TRAVEL DEVIOUS PATHS

These Karen tribes do not grow opium. This may or may not be counted to their credit, but at any rate it is unfortunate from the point of view of communications. Farther north, where the population is Shan, with an intervening zone of hybrid races, which are like nothing so much as a dish-clout that takes up particles of everything it touches, there are what are called opium paths. These are not authorized, since the opium taken over them is all smuggled.

For this reason the paths, so far from taking comfortable lines, follow the most undesirable, and are kept as secret as possible. Therefore they are not so much like tracks as like rudimentary staircases which have been damaged by many earthquake shocks.

Progression over these paths is of the kind that Prince Henri d'Orleans wrote of when he was passing far north from China toward Assam, across the upper stretches of the Mekong and the Salwin. There he said: "We did not walk; we did not climb; it was gymnastique."

That sort of thing may be good for the liver, but it does not commend itself to students of ethnology or mere pleasure-trippers. Even such opium paths do not exist on the western slopes of the Karen Hills. The tribesmen had no wish to come down to the plains, and the Burmese, the former rulers of the country, found it much easier to come from the north.

It will not be possible to reach them by aëroplane until ascent and descent are so far improved that aircraft can land or rise from a croquet lawn or a back garden.

LOIKAW, THE HEADQUARTERS OF THE POLITICAL OFFICER IN CHARGE OF THE KAREN-NI STATES: BURMA

Loikaw is in the only flat part of Karen-ni. Thirty years ago it numbered four huts. The headquarters of the American Baptist Mission to Hill Karens is located here. The bridges look flimsy, but are so substantial that elephants walk over them.

THE ENTRANCE TO KIAW-KU, A BURMESE VILLAGE TEMPORARILY ABANDONED BECAUSE OF CHOLERA

The Red Karen villages are usually far up in the hills and as much off the main roads as possible. They are also surrounded by close fences of live bush growth, reinforced by dry thorn branches and stakes (see text, page 313).

KÈKAWNGDU WOMEN PHOTOGRAPHED FOR THE FIRST TIME IN THEIR LIVES

Note the onlooker, with the solemn mien of a chaperon, standing on the platform. In Burma "Her throat is like the swan" is not a mere poetic figure of speech, in so far as length is concerned (see page 315).

The way, therefore, to get to these Karen Hills is to go up by train from Thazi Junction to the edge of the plateau, and from there to march south for 100 miles. That part of the journey is easy for any one accustomed to camping out.

When it comes to climbing up to the villages, the difference is like that between a gentle stroll for the sake of the digestion, or for contemplation, and hard labor on the wheel, or between croquet and coal-mining.

Animals can go, but it is not well to trust to them. It is on record that a baggage elephant took fourteen hours to cover four and a half miles, and would probably have taken much longer if practically all its load had not been brought in by coolies, and these coolies were the hillmen themselves, not outside men.

RED KAREN WOMEN RESEMBLE WITCHES IN "MACBETH"

Still the visit is worth the trouble and it is an excellent way of reducing weight. The Karens of the hills are savages, no doubt, but not of the kind that eat one another or cut off heads.

There is no need for the visitor to take a Tartarin de Tarascon battery with him. No great amount of money is necessary, either. Beads and small mirrors and clear glass bottles are much more useful, though latterly not a few villages have become sophisticated enough to like rupees, too. But that is because the girls make necklaces of them.

There are a great many Karens in the main province of Burma, and they were, and still are, commonly referred to by their Burmese neighbors and strangers within their gates as White Karens. These Karens do not admit the hill peoples, for convenience sake called the Red Karens, to be their relations, and have the same feelings with regard to them that the Abelites have for the Cainites. It is perhaps natural. Nobody cares for poor and ill-conducted relatives.

The White Karen women are scrupulously clean and neatly, if hardly smartly, dressed. It is a matter of opinion whether they are comely, but at any rate they are sleek and built on substantial lines, and their faces are of the kind that appeals to the Zulu or the story-tellers of The Arabian Nights, who preferred the moon-face to one of the Greek classical type.

The Hill Karens, genuine Red or otherwise, are obtrusively dirty, so dirty that they cannot get any worse, because no more matter can find a place to settle.

Some of these Red Karens wear clothes that force one to believe they are heirlooms, and here and there not a few of the clanswomen might pose day or night, outdoor or in, at a moment's notice, as the witches in "Macbeth." It is a pity, for quite a number of them look as if, after being boiled and scrubbed, they might be well-favored, or at any rate personable.

The Karens are the third most numerous population in Burma. Naturally the Burmese are the preponderating race; next come the Shans, and after them the Karens, with a total which the census of 1921 will almost certainly show to be well over a million.

The different clans are as mutually unintelligible to one another as a Cantonese is to a man of Fuchow or a Pekingese. But that does not prevent Sir George Grierson, the great authority on the ethnology of the Indian Empire, from deciding that Karen is a group of dialects, not of languages, and that it includes only the one language, Karen, spoken in greatly varying patois.

ORIGIN OF THE KARENS IS A MYSTERY

We do not know the original home of the Burmese, or of the Tai, usually called Shans, but what we do know of them, though it is neither extensive nor exact, is full compared with our information as to the source of the Karens. The most baffling thing is that they have no national comprehensive name for themselves, not even for the most numerous and enlightened branch, the White Karens, and what legends they have only lead the learned to disagree, more or less acrimoniously, with one another.

It is perhaps unnecessary to say to any one who knows anything about Indo-China that the name Karen, which we give them, is not known to the people themselves as a nation at all. It is a name borrowed from the Burmese, and how they evolved it nobody knows. At any rate the Karens are miscalled, just

PADAUNG COLD-WEATHER COSTUME

The Padaung women, or Kèkawngdu, as they call themselves, are remarkable because of the extraordinary collars they wear, and are taken down to Mandalay to be gazed at by the Great King of Righteousness and the dwellers of the palace. They have also been on show at all viceregal and less notable durbars (see text, page 315).

WHITE KAREN GIRLS AND CHILDREN (SEE TEXT, PAGE 297)

The White Karen women are much cleaner than their hill sisters, but unfortunately do not look nearly so alert. They reside in the main province of Burma and do not admit that the Red Karens are a related people. Note the primitive notched-log staircase.

A KAREN PLACE OF SACRIFICE (SEE TEXT, PAGE 313)

The rickety bamboo platform is the altar, with half a pig as an offering on it. The curved wooden slab in front is for offerings of flowers and fruit. When any member of a Red Karen family falls sick, a sacrifice is made to appease the wrath of a presumably aggrieved spirit. A fowl is killed and the bones are examined to find out the pleasure of the nat (the Burmese word for spirit). When this is settled the required animal is slaughtered and the head, ears, legs, and entrails are deposited in the nat-sin (shrine of the spirit).

as the Tai are termed Shans, the Chingpaw are dubbed Kachins, the Mon are labeled Talaings, and the Sho, Chins.

Tribal names the Karens have. There are three main tribes of them, the Sgaw, the Pwo, and the Bghai, or Bwè. The Pwo are by far the most numerous, and if to them are added the Pao, who are usually called Taungthu (*i. e.*, hillmen), they include half the race. But the Pao obstinately refuse to be called Karens.

The Karens did not come into Burma in waves, or hordes, like the Burmese and the Shans. No doubt they were displaced by invading neighbors, or migrated because of overpopulation, but they came in in driblets rather than in masses.

THE KAREN TRADITION OF THE CREATION

The people may be taken to be pre-Chinese, and not Tibetan or aboriginal in their present seats, or descendants of the lost Ten Tribes, as some enthusiastic proselytizers would have us believe.

This last conception is due to their traditions of the creation and fall of man, thus translated in strange form by Dr. Mason in his "Burma":

"Anciently God commanded, but Satan appeared, bringing destruction.

"Formerly God commanded, but Satan appeared, deceiving unto death.

"The woman E-u and the man Tha-nai (Adam and Eve) pleased not the eye of the dragon.

"The woman E-u and the man Tha-nai pleased not the mind of the dragon.

"The dragon looked on them — the dragon beguiled the woman and Tha-nai.

"How is this said to have happened?

"The great dragon succeeded in deceiving, deceiving unto death.

"How do they say it was done?

"A yellow fruit took the great dragon and gave to the children of God.

"A white fruit took the great dragon and gave to the daughter and son of God.

"They transgressed the commands of God, and God turned his face from them.

"They transgressed the commands of God, and God turned away from them.

"They kept not all the words of God— were deceived, deceived unto sickness.

"They kept not all the law of God— were deceived, deceived unto death."

This is the White Karen version. The Red Karen deals with creation. Their name for God is Ya-pe:

"The earth at its origin Ya-pe created.

"The heavens at their origin Ya-pe created.

"Man at his origin Ya-pe created.

"The sun at its origin Ya-pe created.

"The moon at its origin Ya-pe created.

"The trees at their origin Ya-pe created.

"The bamboos at their origin Ya-pe created.

"The grass at its origin Ya-pe created.

"The cattle at their origin Ya-pe created."

It seems probable that these religious traditions may have been derived from the Nestorians, who were prominent in China during the Yuen dynasty, and have left a mark behind them in the monument at Sianfu, in Shensi. There are also to the present day Jewish villages in various parts of China that possessed the Pentateuch, and these may have been the source of the Karen legend

At the same time it may be pointed out that savage fancy not unseldom suggests ideas curiously like biblical statements.

A BURMESE TRADITION TELLS HOW GODS BECAME MEN

The Burmese have a myth that heavenly beings came down from the skies to the earth, and there ate Thalésan, a particular kind of rich rice, which gradually made them gross of habit, so that they were unable to make their way back to the higher heavens again, and had to become men and women. This suggests the "fruit of that forbidden tree."

The Chins have a story of the Tower of Babel to account for the various clans that inhabit the range of hills looking down on the Bay of Bengal, and traditions of a deluge are found everywhere.

The Kachins tell a story of the passage over a bridge, to the after-life, which recalls Addison's "Vision of Mirza," and there are many more of the kind that suggest that these folk-myths come down from a long-gone past, like the far-carried boulders of the Glacial Age.

The Sgaw and Pwo of the plains are as civilized as any of their neighbors. The Bghai of the hills are as isolated as the boulders and as little changed from their original state. They are quite a

A PADAUNG DANCE

The movements, to the accompaniment of tuned cymbals and deep-toned gongs, are confined to swaying and side-stepping to funeral measure. There are very few instances of "mixed" round dances in Indo-China and it is singular that it should be found among the Red Karens. Holding hands is considered improper by the Burmese.

KAREN LADIES POSED FOR THEIR PICTURES BY AN OFFICIOUS HEADMAN

The lady on the right is determined that the evil eye shall not fall on her infant. The taking of photographs was by no means an easy matter in the earliest days of the British occupation. It was looked upon as white magic (see text, page 313). One day a chief upon being invited to look at the focusing glass exclaimed, "Why, they're all upside down!" The women took on a conscious attitude on the spot, and the men shifted their feet uneasily, all of them adopting a stained-glass attitude.

THESE SIN-SIN KAREN LADIES TAKE A SOMBER VIEW OF LIFE

The hair of each is drawn through a bamboo ring and confined by a species of thimble at the top. The Sin-sin group do not insist on marriage within the clan, and the women have largely intermarried with the Taungthu, wear cotton coils round the waist, dispense with a petticoat, and instead of a brass rod wear a silver bracelet. Men, women, and children of this group are inveterate smokers, their pipes being made of dry bamboo.

good bit ahead of the cave-man. They are not cannibals or head-hunters and do not seem ever to have had tastes that way. They are not all of them quite on this modest level.

The Red Karens and Padaungs are a long way ahead of the others, and were so far civilized that in the days before the British occupation of the country the former were highly organized slave-traders, making raids into the Shan States to the north to carry off men, women, and children, whom they sold over the eastern border in Siam.

They were shrewd enough to know that ecclesiastics were the most profitable booty; for, since both the Shans and the Siamese are Buddhists, good money was always rapidly forthcoming to ransom the pôngyis, or monks. Sometimes they were ransomed by the people of the villages to which their monasteries be-

TAUNGYO GIRLS FROM THE OPEN COUNTRY: BURMA

The gaiters worn by the girl on the right are to protect her against leeches. The earrings and bracelets are of silver.

THE ZAYEIN KAREN WOMEN WOULD BE COMELY IF THEY WERE LESS UNKEMPT

The men of this clan shave their heads, except for a small patch over the ears, but the hair of the women is generally neglected. Washing the body is deemed an affectation. The inevitable coils of brass rod cover the forearms.

longed, which was the easiest way of getting rid of them, or if all the villagers themselves had been carried off, the pious of the Lao States of Siam were always ready to put up the money and thereby acquire merit toward a new existence.

TRIBES DIVIDED ACCORDING TO CLOTHES

The White Karens of the plains of Burma were easily converted to Christianity, and their pastors and masters set to work to index them with more zeal than discretion.

The so-called clans read like a table of fashion-plates or a history of tartans. The only visible distinction between one clan and another was the dress worn, and naturally, when it came to dress, it was the women that were tabulated.

In one place the women wore a smock with red perpendicular lines. In another there were no lines on the white blouse; instead, there was a narrow border of embroidery at the bottom, with subvariants. Some men had red trousers, others white, with radiating white lines, and so forth.

This haberdashery sort of business is catching, but it is not scientific.

It is not confined to the Karens. The names of the Kachin tribes in the hills to the north of Burma are bewildering beyond endurance, and the Chin clans are not much better. In fairness to the white cataloguers, it is only right to say that the people themselves are mostly responsible, and they had, apart from this, predecessors in the Burmese who recorded such blocks as "River Sheep or Burmese Karens," "River Kyieng or Talaing Karens," "Forest Bees," "Ogres," "Large" and "Small Butterfly Karens," and "Wild Karens." These may be more picturesque, but they are not less scientific than the existing tables.

In the hills there is more justification for this sort of thing than in the plains, for in a formidable tumbled-up mass of peaks and deep gorges there are scores of people who have never been more than ten or twenty miles from home, and so have had years'-long opportunity of developing special village patois. The Karens have, perhaps, suffered more than

A GROUP OF PADAUNGS COME TO MARKET ARRAYED IN ALL THEIR FINERY

Formerly the natives feared the occidental camera, but now the difficulty is to keep people out of a picture. When a traveler wants fowls or vegetables, it is suggested that a photograph would be the most satisfactory mode of payment, and the result is that the villagers crowd in behind to furnish a background. (For a description of the costumes, see pages 315 and 317.)

most in this way and their aliases suggest nothing so much as *Chevaliers d' industrie,* or a slang dictionary.

It is very much as if an inhabitant of Mars were to land in the U. S. A. and gravely record Yankees, Hoosiers, Blues, Pukes, Pennamites, Creoles, Crackers, and Beef-heads as tribal names distinct from Americans proper.

STRIKING PHYSICAL DIFFERENCES BETWEEN RED AND WHITE KARENS

If one were to judge by build and facial characteristics, there is no family connection between the White and the Red Karen. The White Karen is heavy, stolid, and much more stocky in build even than the average Burman. He is what might be called a "worthy" person in the most offensive sense of the word. He is bovine, suspicious, and without any sense of humor. Except in very hot weather, he does not wash himself as often as he ought, and he would certainly defeat prohibition by brewing his own liquor.

The Red Karen is of an entirely different physical type. The men are small and wizened, but very wiry. They have broad, reddish-brown faces and long heads, with the obliquity of eye a little more accentuated than the White Karen, and very much more than the Burman. In former days it was the invariable custom that the men should have the rising sun tattooed in bright vermilion on the small of the back. This custom has fallen into disuse; and the younger men are without it, but they are so desperately dirty, old and young, that a personal detail of this kind is hardly noticeable without close inspection.

LEGS OF WOMEN OF FASHION ARE HEAVILY ARMORED

They wear short trunks reaching to just below the knee. These are red when new, but they speedily turn to an earthy color. These "shorts" are kept in position by a leathern belt, and in the hot weather constitute the entire dress, except for a cloth wound around the head,

TWO KÈKAWNGDU WOMEN MAKING PURCHASES IN THE KAWNG-I BAZAAR: BURMA

The stall-keepers are Shans. The ring at the back of the neck is more clearly seen on the woman sitting down (see text, page 315). The "well-dressed" Karen woman wears as much as 50 or 60 pounds of brass rings on neck, arms, and legs.

above which the hair appears, tied in a knot.

The women wear a short skirt which comes as far as the knee. Usually it is dark-colored, but occasionally it is red. A broad piece of black cloth passes over the back across the right shoulder, and is then draped over the bosom, and confined at the waist by a white girdle, knotted in front, sash-fashion, with flowing ends hanging down with more or less grace, according to the length of time it has been worn.

Round the waist and neck are ropes of barbaric beads, to which the wealthy occasionally add long necklaces of rupees. A profusion of the beads also decorates the leg just above the calf, which is circled by a solid mass of garters of black cord or rattan. Perhaps they should not be called garters, seeing they do not serve to hold up anything. Anyhow, these leg-rings, together with the beads, stand out a matter of two inches from each sturdy limb (see pages 298 and 302).

The result is that their wearers walk

A KÈKAWNGDU DRUM DANCE: BURMA

The man in front of the tom-tom strikes it to a measure. The man on the left of him ducks through between beats. Success means a beaker of spirit at the cost of the striker. Failure, in addition to the clout, means that he has to stand the drink. The Kèkawngdu occupy a tract of 150 square miles and are excellent agriculturists (see text, page 317).

with a sort of compass-like action, and could not run, no matter what the urgency might be. Moreover, it is not easy for them to sit down, and when they do at market stalls or to spin, they stretch their legs straight in front of them. This, to the Shan and Burmese mind, is highly indecorous, for with them the first law in society manners is to hide the feet.

Silver earrings, some of them so large as to be better called ear-cylinders, are worn, and over the head is jauntily thrown a piece of black cloth with red tassels, like those of the Taungthu. The general effect is picturesque and would be really attractive, were it not for a not uncommon meaty odor.

UNCONQUERED BY BURMESE, KARENS QUICKLY YIELD TO BRITISH

The Burmans were never able to overcome the Red Karens, though they made several definite attempts. When the value of the Karen-ni teak timber became

IN FRONT OF A KAREN BACHELORS' HALL (SEE TEXT, PAGE 319)

The unmarried "youth" wear a special dress, varying with the clans. Some have coquettish shell jackets trimmed with seeds or cowries. Almost all have necklets of colored beads, seeds, or stone and wear ear-plugs of every sort of material, from plain wood to chased silver.

GAUNGTO (ZAYEIN) BOYS BUYING CANDY IN THE KAWNG-I BAZAAR

The big hat of the Shan stall-keeper is made of bamboo spathes. One of the strange superstitions of the Gaungto is that which forbids the presence of eggs in a village during the reaping of the fields. As soon as the harvest begins, all the eggs in the community are gathered and thrown away, outside the village.

DAMES AND DEBUTANTES OF THE KAREN HILLS

The background gives an idea of the topography of the region inhabited by the Red Karens—a jumble of steep hills with narrow valleys between. The paths are almost impassable for beasts of burden (see text, pages 293 and 297).

known, the Indian Government interfered, and by the treaty of Sir Douglas Forsyth the independence of Karen-ni was guaranteed. When, therefore, in 1886, the Burmese Kingdom ceased to exist, it appeared that this independence was guaranteed by the Government of India against the Government of India, and the five Karen-ni States remain under ruling chiefs, but they are under the control of the political officer of the Southern Shan States and are only technically outside British India.

For a time after the occupation of the Shan States the Red Karens gave some trouble, and ignored letters of warning. They believed that British troops could no more take Sawlôn than the Burmese could, and accordingly they went on stealing cattle, and even overran a neighboring Shan State (Mawkmai), burnt the capital, and carried off slaves, quite as in the old days. Accordingly a British column marched against them, and the resistance collapsed with dramatic rapidity. Since then the Karens have given no trouble. From swaggering bullies they changed, in a matter of weeks, to listless cultivators.

In the old days the Red Karen never went out without *dha* (sword) and gun, and in addition had a small sheaf of spears or rather javelins. Now, the guns remain at home, only to be used when there is a death in the village. They are fired then to scare away the disembodied spirit.

All the dead are looked upon as evil-minded or, at all events, malevolent characters, best driven away.

THE DISTINCTIVE KAREN SPEARS HAVE VANISHED

The Karen spears have vanished so completely that the hunter after curios has difficulty in getting them. They were of a very distinctive character, sharpened on one side only, like a knife-blade, with a male bamboo shaft that had a spike at the butt, so that the owner could stick it in the ground when he was hoeing his fields or cutting his crops, and be ready for any stranger.

But the Red Karen remains a heavy drinker. Early prospectors for teak forests used to say that a genuine Karen-ni never went abroad without taking a bamboo on his back, from which a tube led to his mouth. Apparently they could carry their liquor then, inside and out.

In addition to their liking for spirits from the still, the Red Karens are devotees of the spirits of the air, the flood and the fell. Latterly a few have become nominal Buddhists, and some have even founded monasteries and built pagodas, but none of them give up their belief in nats, to use the Burmese word for spirits.

The most obvious occasion for worship is when any of the family fall sick. A sacrifice is then made to appease the wrath of the presumably aggrieved spirit. The first thing killed is a fowl which is cheap, and the bones are then examined to find out whether the nat would like fowls, pigs, dogs, or bullocks as a sacrifice. When this is settled the required animal is slaughtered, and the head, ears, legs, and entrails are deposited in the *Nat-sin*, the shrine of the spirit (see page 300). The family eat the more desirable parts of the carcass which remain.

In the old days sacrifices of this kind on a larger scale, since the whole village was concerned, were always the prelude to a raid, or a warlike expedition against thieving neighbors.

CHICKEN BONES ARE A "WHERE-IS-IT?" BOOK

Chickens' bones are the Red Karen's dictionary and "Where-Is-It?" book. He consults them to know where he should build his village or his house; whether he should start on a journey, and, if so, in what direction, on what day, and at what hour; whether he should marry a certain girl, and, if the omens approve, on what day he should do it; where he should make his hill-clearing, when he should prepare, sow, and reap it; in fact, he does nothing without authority from fowls' bones.

The Red Karen villages are usually far up in the hills and as much off main roads (if paths a couple of feet wide, along the sides of hills or meandering up rocky gorges can be called roads) as possible. They are also surrounded by close fences of live bush growth, reinforced by dry thorn branches and stakes (see page 295).

The Karen-ni are firm believers in original sin, and, to baffle thieves, keep

BRÈ GIRLS, VERY DISTRUSTFUL OF THE PHOTOGRAPHER

Note the boar's tusk necklace. The household means have not admitted of brass coils around the arms, but the legs have not been neglected; neither have the lobes of the ears (see text, page 318).

their pigs, oxen, and buffaloes below their houses, which stand on piles. They have quantities of timber, so their houses are much more generally of wood than those of the Shans, farther north. Like them, they are covered with thatch, and the eaves come down to the floor level; consequently they are almost pitch-dark (see pages 310 and 314).

BURNING ALONE SPRING-CLEANS A KAREN-NI HOUSE

The fact that the houses are solid and last a long time is rather a disadvantage. One visit to a Karen-ni house usually satisfies the most curious. He makes for his tent afterward and scratches himself spaciously. If you travel in these hills, take a tent with you and pitch it outside the village. Burning is the only satisfactory way of spring-cleaning a Karen-ni house.

The people have feasts, which consist mainly in gorging on fowls and pigs, and much drinking of spirits. They have dances; the most energetic is a sort of die-away Maypole figure.

The latter-day Red Karen is a very listless person. Those who are not steal elephants and other people's property generally, and have to be suppressed.

This apathy may be said to be born with them. When a Karen-ni child is born the mother takes the baby in her arms, as soon as she is able to walk down the sloping board with nicks in it which constitutes the staircase (see page 299), and gets a mattock from under the house. With this she hoes up a little ground. This is to impress upon the infant that it will have to work for its living.

The children do not get a good start. They are fed with liquor from their earliest years. If a mother is too zealous at hoeing the fields to find time to suckle her infant, she takes a mouthful of liquor and feeds it from her own lips.

The taking of photographs was by no means an easy matter in the earliest days of the British occupation. It was looked on as white magic, and the sight of the camera, and more particularly of the focussing cloth, was enough to send all the women scuttling off into the jungle or into the black darkness of their homes.

Perhaps no one is altogether free from self-consciousness when being formally photographed, but of these tribes the Padaungs are the least affected and the least unwilling to have their likenesses taken. They are remarkable because of the extraordinary collar worn by the women. Even in Burmese days, Padaung women, or Kèkawngdu, as they call themselves, were taken down to Mandalay to be gazed at by the Great King of Righteousness and the dwellers in the palace. They have also been on show at all vice-regal and less notable durbars, and are quite as much accustomed to being snap-shotted as actresses or political leaders (see illustration, page 298).

The women's neckband is of brass rod, as thick as the little finger, commencing with a wide base on the shoulder-blades and reaching up to the chin. Little girls begin with them as early as possible, and five rings are as much as most of them can manage, but the neck is kept constantly on the stretch, until the ordinary limit of twenty-one coils is reached. Twenty-five seems to be the record.

At the back of the neck, fastened through the main coil, is a circlet of rings, about double the diameter of those used for curtains. The inevitable suggestion is that these are used for tying the ladies up when occasion seems to require it. Inquiry of the Kèkawngdu has not so far resulted in a direct answer. They all grin. In the case of the men, this may mean the acceptance of a hint, or a tribute to the questioner's acuteness.

THE AVERAGE WOMAN WEARS 50 OR 60 POUNDS OF BRASS RODS

In the case of the women, a glance at the arm appears to imply that they have on both arms a weight of brass, which would give a clout that would defy coercion, for they have similar coils of brass rod on the legs and the arms, and the length of these seems only limited by the space available or the ability of the household to pay for the rod, for brass is very expensive (see illustration, p. 308).

The total weight carried by the average woman is fifty or sixty pounds, and here and there some manage as much as seventy or even eighty.

Burdened with this weight, they hoe the fields, carry water for domestic use,

A GAUNGTO BACHELOR

"I have no wife to bother my life." The rules governing marriage within the clan are so strict among many of the Karen groups that in some places there are many doddering bachelors in the Bachelors' Hall and plenty of aged spinsters without a home of their own (see text, page 319).

and go long distances to village markets to sell liquor. They brew a great deal of very fiery stuff and sell it to most of their neighbors, carrying it in flagons made of woven strips of bamboo lacquered over with wood-oil, and dispensed in goblets of the same manufacture.

The cups are of most generous size. They hold about half a pint, and those not trained to it usually become noisy after one.

The brass-collar fashion does not seem to affect the women's health. There are plenty of active old crones among them and families of eight or ten are quite common. The only noticeable effect is that the women speak as if some one had them tight round the neck. They wear colored scarfs twisted into the hair, jumper coats which slip over the head, have a fashionable V-shaped front and back, and very short sleeves, with occasionally a little embroidery.

The skirts are really kilts, stopping above the knee and striped red and blue. The necklaces are of the usual kind, with cornelians and other stones, coins, and beads.

The men are not nearly so picturesque. Near main trade routes they wear the baggy trousers and short coats of the Shans. The remoter villagers wear shorts and cane leg-rings. An attempt at decoration is seen in the anklets made of shirt-buttons and kaleik seeds (the white seeds of a herbaceous plant), and every man carries a powder-and-shot case strapped to his belt. These are of wickerwork, neatly embroidered with brass bosses and raised scrollwork, and they glitter with wood-oil varnish.

GREAT SKILL SHOWN IN BUILDING IRRIGATED TERRACES

The Kèkawngdu occupy a tract covering, perhaps, 150 square miles. They are zealous agriculturists. Every available nook of the valleys is terraced for irrigation, which is carried out with great skill and eye for contour. They grow a good deal of cotton and make their clothes of it. The average height of their country is between three and four thousand feet, with peaks rising to five thousand. Their roads are well aligned, fairly broad, and much used, and are considered very good by those who have been traveling over other hill-roads, though a bicycle would have to be carried for three miles in every four.

Pack bullocks are kept and caravans go down to Toungoo on the railway. On the whole, they may be said to be the best of the hill races in this neighborhood, and they have great game drives with trained dogs (see pages 296, 298, 302, and 307-9).

Some authorities have doubts as to whether they are Karens and want to place them in the Môn-hkmêr group. Their language, however, has many similarities with Taungthu.

MALIGNANT SPIRITS ARE SEDULOUSLY WORSHIPED

Like all their neighbors, they are spirit-worshipers, and the names of their divinities seem to be much the same for all. Some of the spirits are bad, some indifferent, and a few amiable. The malignant ones are sedulously worshiped with sacrifices, the others only at moments of leisure or expansiveness, after surplus liquor has been consumed.

Some distance to the north of the Padaung country—with the small Red Karen State of Nawngpalai intervening—is the Brè tract.

Their country is of a different character from that of the Padaungs. It is a much more emphatic jumble of hills, very high and steep, with exceedingly narrow valleys in between.

The dress of the Brè men is more distinctive than that of the Padaungs. They wear a pair of very short trousers, striped red and white, and tied at the waist with a bit of string. A blanket of coarse cotton cloth serves for a coat, and their long black hair is tied into a knot, just over the right temple, and the rest, apparently never combed, hangs over the shoulders and face. On their legs they wear cotton circlets below the knee, with brass rings to keep the coils apart. Many of them also wear necklets or torques of brass.

The dress of the women varies for the three groups, but the differences are not great. The chief garment is a gaberdine called *thindaing* by the Burmese, perhaps more like a poncho, since it is slipped over the head, and has either rudimentary sleeves or none at all. They also

WHITE KAREN TRADERS

The man on the left wears the national *thindaing* (see text, page 317), the one on the right a hybrid European suit, and those in the middle the ordinary coat and trousers of the Shan.

wear a short kirtle which reaches within a hand's breadth of the knee, but some dispense with this. It is red and blue in stripes (see illustration, page 314).

The women in the northern section of the Brè tract have brass tubing coiled round the leg from the ankle to the knee, and from above the knee to half-way up the thigh. The southern Brè women have to content themselves with cotton coils instead of brass. Both wear large brass hoops or torques round the neck, and enormous ear-plugs are fixed through the lobes of the ears (see page 320).

They have no head-dress, and their hair, which is as unkempt as that of the men, is tied in a knot at the back of the head. They marry very early—the girls at about thirteen, the youths at fifteen years of age.

THE HUSBAND SURRENDERS HIS FINERY TO HIS BRIDE

It is an easy matter to determine whether or not a man has a wife. The unmarried wear pebble necklaces which have been handed down from father to son for generations. Some of them are valued at fifty rupees, which is wealth for these hills.

Besides these, large brass rings encircle the man's neck, hang from the ears, and are inserted in the cotton garters on his legs. The northern Brè bachelor adds to these ornaments a twisted bamboo band round the head, studded with mother-of-pearl shirt-buttons or small red and green beads, as a sort of setting to the shards of large green beetles.

All this finery goes to the wife when he gets one, and as a husband he is reduced to a pair of trousers, a blanket, and some unornamented black rings round his legs. A rudely carved wooden comb sometimes remains fixed in his top-knot as an ornament, not for use.

Both sexes stain their teeth black, using for the purpose the leaves of a tree which the Brè call Thüpo, mixed with lime-juice.

The staining is a ceremonial performance. All the children of the village, at about the age of ten, are taken to a secluded thicket at sunset. They have to close their eyes, cover them with their

GAUNGTO WOMEN OF LOILÔNG VILLAGE

Note the leg-rings inserted in rattan garters. The weight of these rings frequently makes it so difficult for the wearers to get about that they use sticks for support. The members of another tribe wear tightly coiled brass rings around their necks, adding one and another from time to time, until their necks are elongated like a fowl and they cannot move them (see illustrations, pages 296, 298, and 307). Note the babies on their mothers' backs.

hands, and chew all night long. At daybreak they return to the village, and the result is inspected by the elders to the sound of castanets and a peculiar kind of bassoon made out of a buffalo horn. It is believed that if they open their eyes their teeth will take the color of whatever their sight falls on. That is why they go to the jungle; their minds might be distracted from the chewing in the village.

The rest of the Karen tribesmen of these hills form much smaller groups, but they all have their distinctive patois, due, no doubt, to the detestably rugged character of the country.

STRANGE MARRIAGE CUSTOMS

And they all, at least the women, have their distinctive peculiarities of dress. These are far beyond the complexities of rowing or lawn-tennis "blazers," and it would need a stamp-collector or the compiler of a biographical dictionary to catalogue them all.

One thing, however, is common to them all, and that is the strictness of their rules of endogamy. Only cousins or only the inhabitants of certain groups of villages may intermarry, and contracts of the kind have to be approved, and are usually arranged, by the elders of the village.

As soon as a boy has reached the age of puberty he has to go to live with the other unmarried youths in a barrack called the *Lubyo Haw,* the Bachelor Hall, which may be outside the village, but is usually in one corner of it. There he stays until he is married, and must not enter the house of his parents or talk to any of the young women of the village until that time (see page 310).

The limitations of possible alliances are so considerable that in some places there are many doddering bachelors in

WITH ALL HIS WORLDLY GOODS HE HER ENDOWS

The unmarried Brè man wears a pebble necklace which has been handed down from father to son for generations; large brass rings encircle his neck, hang from his ears, and are inserted in his cotton garters. All this finery goes to his wife when he gets one. The husbands of these two matrons were evidently well provided with such valuables when they renounced bachelorhood (see text, page 318).

the Bachelors' Hall and plenty of aged spinsters without a home of their own.

YOUTH OF 15 SOMETIMES TAKES WOMAN OF 70 FOR BRIDE

The only occasions on which lads and lassies meet are at marriage feasts and at wakes. These festivals last over three nights and are veritable orgies, with great excess in eating and drinking. Both sexes are well-seasoned vessels, since they begin drinking strong drink before they are weaned; but there are those who say that these gatherings are as scandalous as the agape which the Council of Carthage denounced as being no better than the Parentalia of the heathen.

This limitation of marriages to near relations results quite often in unions where husband and wife are of very unequal age, the husband fifteen, the wife seventy, or the other way about.

Punishment for marriage out of the clan was formerly very severe. A large hole was dug in the ground and a log placed across it, to which two ropes were attached. The ends of these were noosed round the necks of the offending pair. They were then made to jump into the pit, and so hang themselves.

This is no longer allowed, so they are excommunicated instead and never allowed to enter a Karen village again. The two villages of Kara in the Nan-kwo circle are said to be inhabited entirely by such eloping couples.

The Banyang or Banyôk Karens are of all the clans the most distressingly rigid in their endogamy. Marriages are only permissible between the occupants of the village, and the number of houses is under a dozen. In the days before the British occupation a hill official called a *Taung-sa* (literally hill eater) made an annual visit to the village to see that there should be at least one marriage in a twelve-month. Neither parents nor the principals were consulted; the Taung-sa simply ordered a couple to be married, and married they were, just as a man might be summoned to serve on a jury.

They were all officially gazetted alliances, so to speak, and the Taung-sa's fees were no more than two pots of liquor. The smallness of the village made the further condition that the bride and bridegroom must be cousins, less troublesome than it might have been if there were hundreds of houses in the village instead of a number that could be ticked off on the fingers.

UNWILLING BRIDEGROOMS KEPT UNDER GUARD

The neighboring villagers say that there is so little hint of inclination in the matter that the bridegroom has often to be taken by force to the bridal chamber. The Taung-sa's police have that duty, and having got him there they see that he stays for three days and three nights. The village always provides a bridal feast, which is of the usual hard-drinking kind. It may be, therefore, that the seeming want of gallantry on the part of the happy man is due to incapacity to go without help, or to a reluctance to leave while any drink remains. The bride carouses by herself on the nuptial couch.

There are some races in Australia and the South Seas that have similar rules, but their endogamy does not go nearly so far as this. The Banyangs have no laws against widows remarrying. They must do so, in fact, if the Taung-sa happens to order it. Since there is so much worry in marrying the people, it is not surprising to hear that divorces are absolutely forbidden.

Deep down in the Paunglaung Valley, on a river which in its later course is called the Sittang and flows into the sea between Rangoon and Moulmein, is a clan called the Mèpu. Its members are classed as White Karens and certainly show a link with the Sgaw and the Pwo. They have this tradition of their origin:

Hundreds and hundreds of years ago there were a brother and sister called Lanyein and Among. They lived at Ela, a village in the Pyinmana district north of Toungoo. They had a magic drum which supplied them with anything they wanted when it was beaten. One day Lanyein gave Among half a porcupine. Unfortunately it was the half with the quills, which pricked the girl in the hand, and she was very angry.

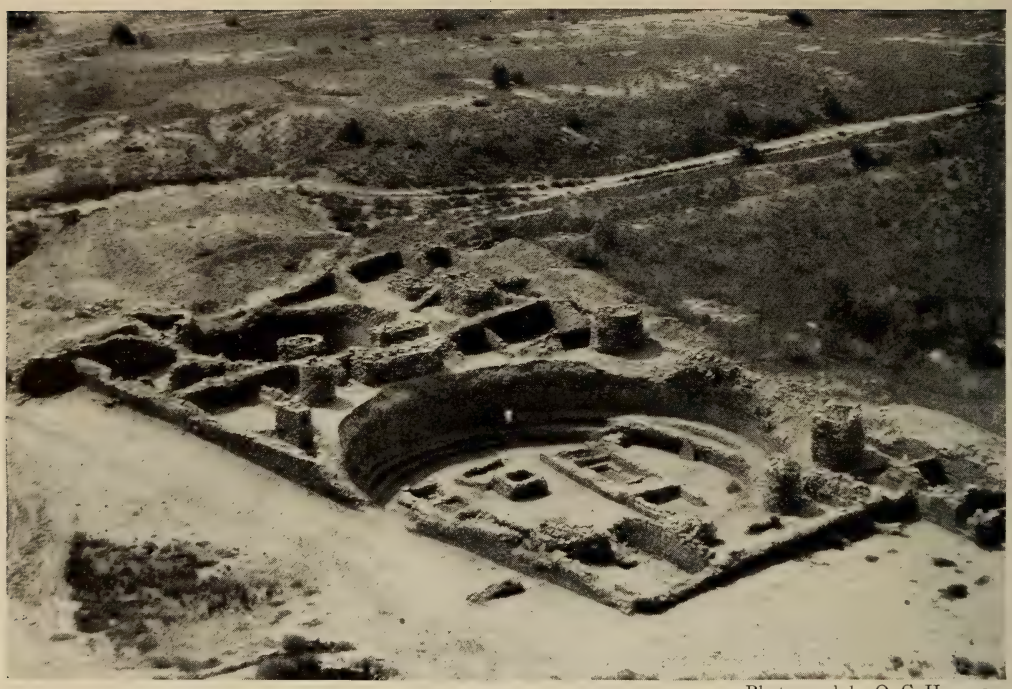
To revenge herself, she told her brother the drum needed a new skin. He followed her advice, with the result that the wish-drum became useless.

Lanyein then decided he must go away elsewhere, and set off accordingly without telling his sister. She started to follow him a day or two later, but when she got to a village called Maungla, she was worn out and stayed there. She married one of the villagers and the present Mèpu clan form her descendants.

Lanyein walked right over the hills into China. There he got a great name for his magical powers, and in time was chosen Emperor of China, Udibwa (Egg-born), as the Burmese and Shans call that potentate. In those ancient days the women of China wore brass anklet rings, and Lanyein sent his sister twelve of them as a present. They were so much admired that all the women took to wearing them.

The tale does not suggest any great imagination or narrative power, but it does hint at the original home of the Karens.

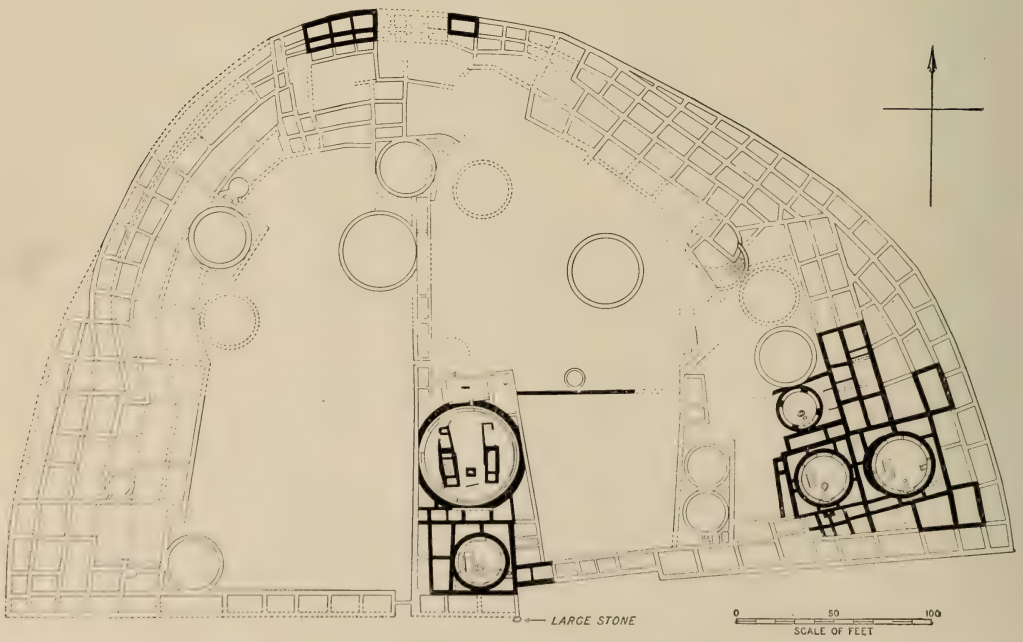
Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your May number, the Society should be notified of your new address not later than April first.*



Photograph by O. C. Havens

THE GREAT KIVA OF PUEBLO BONITO, WITH ITS SURROUNDING ROOMS, VIEWED FROM THE NORTH CLIFF (SEE TEXT ON OPPOSITE PAGE)

This was the most important council chamber or ceremonial room of the Bonitians. The small hollowed square of masonry in the center of the room was the fireplace.



A DIAGRAM OF PUEBLO BONITO: THE BLACK LINES SHOW THE PORTION OF THE RUIN EXCAVATED BY THE NATIONAL GEOGRAPHIC SOCIETY'S EXPEDITION OF 1921

During the coming summer the 1922 expedition will continue its work on the ruins at the right, working in a northwesterly direction.

THE PUEBLO BONITO EXPEDITION OF THE NATIONAL GEOGRAPHIC SOCIETY

By Neil M. Judd

Leader of the National Geographic Society's Expeditions of 1921 and 1922

PUEBLO BONITO is a pre-Columbian village, now in ruins, situated in northwestern New Mexico. Its exact age is unknown, but there is an increasing hope that this will be closely approximated before our studies have been completed.

We might, I believe, assume with some degree of certainty that the village was occupied 1,000 years ago.

I do not mean to say that Pueblo Bonito was erected, or that it was abandoned, in the year 922 A. D. My thought is that if it had been possible for us to look down from the cliffs, say 800 or 1,200 years ago, it is likely we should have seen happy children at play on the housetops and their elders busy with varied activities in and about the village.

Pueblo Bonito is a colossal apartment-house, not the first of its kind, but one of the largest and best known at that early period. Its equipment, its furniture, is a bit out of date, to be sure, but many a city dweller of today would welcome the freedom of its spacious rooms (see diagram, page 322).

This aboriginal village or pre-Columbian apartment hotel was a whole community in itself, since it covered a little more than three acres and sheltered between 1,200 and 1,500 individuals. Roughly speaking, its foundations were approximately equal to those of the United States Capitol.

There were more than 300 rooms on its ground floor; its outer walls were four, perhaps five, stories high. Portions of fourth-story walls still stand. Its houses were terraced upward from two inner plazas or courts, like the magnified seats of an amphitheater.

The modern pueblo of Acoma, southwest of Albuquerque, New Mexico, possesses several features closely paralleling those of Pueblo Bonito. Its houses are in long rows, with a high wall on one side, unbroken except for small ventilators, and, opposite, stepped houses overlooking the plazas. Acoma is the oldest continuously inhabited settlement in the United States; its population has been estimated at between 1,000 and 2,000 when the Spaniards first attacked it, in 1540 (see illustration, page 324).

Our initial explorations, conducted during the summer of 1921, afford a reasonably accurate view of Pueblo Bonito. The building is semicircular. It is 310 feet north and south; its south face is 518 feet long. If stood on end, this wall would reach to the windows of the Washington Monument.

The twenty or more circular kivas (a kiva was both a council chamber and a religious sanctuary) border the two open spaces where public ceremonies were enacted. The clustered dwellings overlooking these courts furnished seats for gathered spectators, just as the housetops of Oraibi are now utilized during the Snake Dance and other native dramas.

The shaded sections of the diagram on page 322 mark most of the rooms excavated last summer, but tests made elsewhere disclosed buried structures not shown on this plan.

THE BONITIANS USED THREE TYPES OF MASONRY

One of the most important results of our first season's work was identification of three distinct types of masonry employed in construction of the pueblo.

In the north and northwest sections of the ruin, dwellings with very crude stonework are found. These houses formed the nucleus of Pueblo Bonito; their builders possessed a culture cruder and less artistic than that of the peoples who came later to join with them and who were largely responsible, we may safely assume, in the development of the great community whose shattered walls first attracted our attention and now command our admiration.

The outline of this more primitive settlement has not been wholly traced, owing to the fact that it was partially destroyed and built over as newer buildings were erected.

CAMP OF THE NATIONAL GEOGRAPHIC SOCIETY'S 1921 PUEBLO BONITO EXPEDITION

Photograph by O. C. Havens

THE MODERN PUEBLO OF ACOMA CROWNING A ROCK FORMATION SOUTHWEST OF ALBUQUERQUE, NEW MEXICO

Photograph by Charles Martin

This, the oldest continuously inhabited pueblo in the United States, possesses several features closely paralleling those of Pueblo Bonito

(see text, page 323)

Photograph by O. C. Havens

THE SOUTHEAST SECTION OF PUEBLO BONITO (NORTHWESTERN NEW MEXICO), SHOWING PART OF THE ROOMS EXCAVATED BY THE NATIONAL GEOGRAPHIC SOCIETY'S 1921 EXPEDITION

The partially razed camp of the 1921 expedition is seen in the upper right-hand corner. The 1922 expedition will leave Washington in a few weeks to pursue its work of excavation and exploration. The vast ruins were occupied a thousand years ago by perhaps 1,200 or 1,500 individuals (see text, page 323).

Photograph by Charles Martin

THE HOPI VILLAGE OF WALPI, WHOSE TERRACED HOUSES STAND OUT AGAINST THE BLUE ARIZONA SKY LIKE AN ANCIENT RUIN

This is the most picturesque of the Hopi towns, and some of the clans of this tribe of Indians are known to have migrated from cliff dwellings such as those to be found on Mesa Verde, Colorado. The Zuñi Indians say the Hopi people built the great houses of Chaco Canyon (see text, page 329).

The illustration on page 328 shows the three principal types of masonry—the oldest, the latest, and the intermediate.

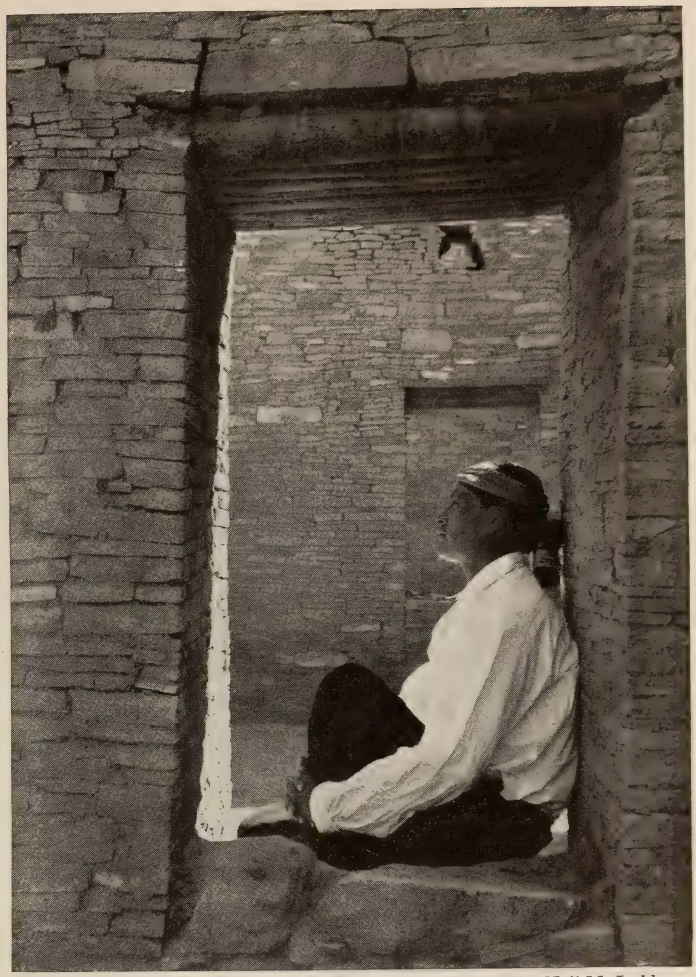
Whenever one of the old Bonitians got a new idea, he set about its realization, even if this meant destruction of the house he had erected with infinite labor. Beneath a large majority of the 40-odd rooms excavated during the summer of 1921 we found the razed walls of still older houses.

The excellent example of the second type of masonry shows blocks of friable sandstone rubbed smooth on the face, laid in adobe mud, and chinked with innumerable small chips.

Walls of the later period are of laminate sandstone, laid close together and frequently with larger blocks placed to form decorative bands.

These variations in masonry can mean only this: Irresistible influences were at

work, asserting their supremacy. But whether these influences represent merely local developments or culture phases introduced by new comers is a problem we have yet to solve. We know that peoples from other regions came to dwell at Pueblo Bonito, for we have found numerous examples of their characteristic arts.



Photograph by Neil M. Judd

PERHAPS AMONG THE TRADITIONS OF HIS PEOPLE THE SOLUTION OF THE MYSTERY OF PUEBLO BONITO WILL BE FOUND

This Zuñi boy may be a descendant of the aboriginal artisans who quarried the stone and mixed the mud that went into the towering walls of Pueblo Bonito (see text, page 330).

DIFFICULTIES AND REWARDS IN PUEBLO BONITO RESEARCH

This work of exploration, this digging into deep rooms, this ferreting out of hidden facts, has its difficulties and its rewards.

The chief recompense is the satisfaction one derives from adding a few sentences to the world's history, in contributing even a short paragraph to the story of human progress. There is an immeasurable joy in starting work on a gigantic rock pile—the accumulation of fallen walls and centuries of wind-blown sand—and finding, after a few hours' labor, a whole series of ancient dwellings unfolding itself.

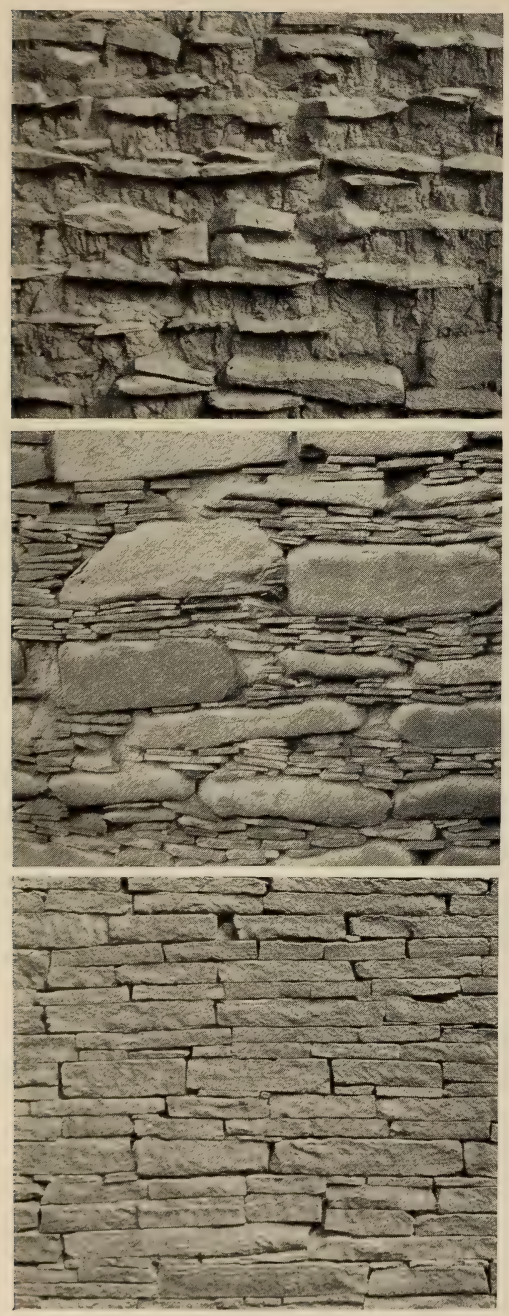
Fragments of information, constantly being uncovered, hold one to the task. Teams can be used upon occasion, where the amount of earth to be removed exceeds the quantity of stone, but difficulties increase in proportion to depth, and the uninitiated can scarcely realize the problem of clearing deep rooms beneath interlocked and, often, insecure walls.

WAR CLOUDS OFTEN DISSIPATED WITH CANDY

Early spring months in desert canyons of the Southwest are notorious for their sandstorms, and our camp was exposed to all the winds that blew, no hidden corner being safe from permeating dust clouds. In direct contrast, midsummer brings the rainy season, when everything, even one's sense of humor, gets wet and soggy.

The sandstorms were a daily torment throughout the greater portion of the summer.

It was a weird sight indeed to see a cloud of flour-like sand rolling over a distant cliff and up the canyon on the very heels of a saturating shower. Nothing



Photographs by O. C. Havens

THREE TYPES OF PUEBLO BONITO MASONRY

Each of the sections photographed is two feet square. Crude stonework (see top) is found in the oldest portion of the ruin. The middle picture shows a second type in which sandstone blocks, rubbed smooth on the face, and small, thin chips are characteristic. The latest masonry (at the bottom) consists of rather uniform fragments of laminate sandstone laid close together (see text, pp. 323, 326).

escaped this dust; it found a way beneath watch crystals, into locked trunks, and, worst of all, into food served by an incomparable cook.

During the first busy weeks in camp and before our tardy tents arrived, sand showered down on piles of equipment like a fog of pumice thrown out by that greatest spewer of all, old Katmai.* For partial protection the camp stove was dragged to a neglected dugout fresh with the unmistakable odor of Navaho goats; then a rude screen was raised, and still later the front of the shed was completely closed.

Happily, the intensity of these periodic storms decreased as the season advanced, but the smell and the taste of them remained to the very end.

Early and late, each day ushers in its own problems in the work of excavation, and there is also the ever-threatening possibility that one or more amiable-looking Indians will flare up over some imagined injustice, causing temporary mutiny in the ranks. War clouds have been dissipated more than once with a handful of cheap candy or a five-cent bag of imitation tobacco. I am a firm believer in the efficacy of the lowly gumdrop and the pipe of peace.

And then there is the mother-in-law question. I suppose no previous expedition of the National Geographic Society has been made the victim of the famous mother-in-law joke; but the Navaho have a belief that a man becomes blind if he looks upon his wife's mother. The tradition has its obvious advantages and its disadvantages. If during the working day the mother-in-law of one of our Navaho men happened to pass, the latter abruptly turned his back or dropped his shovel and pulled his shirt over his head, simulating a hiding ostrich, until she had disappeared.

THE ANCIENT BONITIANS WERE TRUE NEIGHBORS

The ancient Bonitians were agriculturists by choice—permanent habitations were erected only by sedentary, agricul-

* See accounts of Mt. Katmai and the Valley of Ten Thousand Smokes in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1913, January, 1917, February, 1918, and September, 1921.

turally inclined peoples—and yet a portion of their food supply was obtained by hunting the deer, the antelope, and the wild turkey.

They were true neighbors to each other and had developed the community spirit to a high degree. Locked doors were unknown in Pueblo Bonito. As an example of the coöperative spirit which prevailed, I would cite the skeleton of a mule deer, fragments of which were found in a dozen different rooms. The animal had been killed by one or more hunters and its flesh distributed among the immediate neighbors.

Construction of Pueblo Bonito was a community enterprise. Gathering the stone, bringing mud and water, and transporting the huge beams that roofed the dwellings were tasks shared by its inhabitants.

The garden plots tended by the menfolk were considered town property; the whole village united in planting and harvesting the principal food crops. Corn, beans, and squash were raised, but the Bonitians depended, also, upon seeds from the wild grasses which carpeted their sandy mesas.

The village was governed by regularly chosen representatives, who met in the kivas and transacted their business under protection of supernatural beings.

PUEBLO MYTHOLOGY MAY HELP TO SOLVE MYSTERY OF BONITIANS

We do not know where the original settlers came from; their origin has not yet been traced definitely. Research will determine this in time; but there is another source of information to be drawn upon. I refer to the mythology of inhabited Pueblo villages in New Mexico and Arizona.

The modern pueblos, as we know them, are made up largely of previously unrelated groups, brought together for common defense against ancient enemies and, later, against the Spanish conquerors of the 16th and 17th centuries.

During recent excavations at Hawikuh, one of Coronado's "Seven Cities of Cibola," remains were found of a still older ruin, in which certain features are not unlike those in Chaco Canyon pueblos.

Acoma, on its lofty pedestal, may hold an important clue for us. It is the oldest inhabited village in the United States, and I have already mentioned certain architectural similarities between its dwellings and those of Pueblo Bonito.

It may be that our solution will be found in Walpi, most picturesque of the Hopi towns (see page 326). My Zuñi workmen, perhaps in an effort to shield their own traditions, expressed the belief that Hopi peoples had built the great houses of Chaco Canyon. There may or may not be a basis for this assertion, but

Photograph by Neil M. Judd

HE DUPLICATES PREHISTORIC MASONRY

Jack Lavery was intrusted with the important task of repairing the shattered walls of Pueblo Bonito. His genial smile and his skill in imitating accurately the handiwork of ancient artisans won him the Zuñi name "Enote Nahme"—Prehistoric Grandfather.

Photograph by Charles Martin

IN THE "LITTLE CANYON OF THE BEANS"

The canyon is located northwest of Santa Fé, New Mexico, within easy automobile distance, and is visited by many tourists. Ancient peoples of this valley carved with stone implements small rooms called "cavate lodges" in the sheer cliffs of tufa, and were therefore under no compulsion to construct elaborate community houses such as are to be found at Pueblo Bonito.

Photograph by O. C. Havens

CAUGHT IN THE QUICKSANDS

The expedition car was caught in Chaco Canyon quicksands one Sunday afternoon when on exploration duty, and this photograph was taken while waiting for an Indian runner to fetch help. After six hours' strenuous work the machine was rescued through the united efforts of ten men, a team of horses, and a second truck; once on firm ground, it returned to camp (see illustration, page 324) under its own power.

some of the Hopi clans are known to have migrated from cliff-dwellings in the San Juan drainage, among which those of the Mesa Verde stand supreme. The characteristic pottery of this region has been found among the later dwellings at Pueblo Bonito.

The Navaho possess a questionable myth that their ancestors attacked Pueblo Bonito, driving out its inhabitants, who fled to Zuñi. Native historians may hold the key to our problem, but only time and an absolute confidence in a friendly questioner will separate it and them. Who knows but what the Zuñi boy shown on page 327 is a descendant of the aboriginal artisans who quarried the stone and mixed the mud that went into the towering walls of Pueblo Bonito?

On long winter evenings, in modern pueblos, the boys gather around the old men, bask in the warmth of an open fire, and draw forth tales of "the people who used to be." These stories form the unwritten histories of various groups; they trace clan migrations from ancestral homes; they hold the heart-burnings of peaceful village folk, exiled by threatening blows from an enemy tomahawk.

How easy it would all be if we possessed the far-seeing eye of tribal heroes; if we could only picture the scenes that have been witnessed from the ancient watch-tower which still stands sentinel over the ruins of Pueblo Bonito.

Once we possess the outlines of such myths as may still exist, the cultural objects now deeply buried beneath the crumbling walls of the Beautiful Village will take on a new meaning and a new value. With these objects we can retrieve the unwritten records of Pueblo Bonito and establish for this greatest of all our pre-Columbian ruins in the United States its true relationship to the human history of the New World.

Photograph by Captain A. W. Stevens

LAYING DOWN A POISON POWDER BARRAGE AGAINST CATERPILLARS

Flying at the rate of 80 miles an hour, at an altitude of from 20 to 35 feet and on a line parallel with and 53 yards to the windward of a catalpa grove. A wind, varying from 8 to 11 miles an hour, was blowing in the direction indicated by the arrow. The grove lies directly ahead of the point of the arrow, and is surrounded on the two sides by fields of growing corn. This, as well as the following pictures of the machine in action, was taken from an accompanying plane.

FIGHTING INSECTS WITH AIRPLANES

An Account of the Successful Use of the Flying-Machine in Dusting Tall Trees Infested with Leaf-Eating Caterpillars

By C. R. Neillie and J. S. Houser

IN THESE very modern times one should be prepared to expect the unusual, but to be told upon inquiry for a man at his office that "He is up in the air; I don't know when he will come down" is so ultra modern that the average person would be taken somewhat aback.

Such, however, was the experience of the writers one day last summer during the course of the work herewith reported. And after a short time, the one for whom inquiry was made did safely "come down." This was Lieutenant J. A. Macready, Acting Chief of the Flying Section of the Government's Aviation Experimental Station at McCook Field, Dayton, Ohio,—the man who piloted the machine which was an epoch maker in the annals of insect warfare.

THE ADVANTAGES OF AIRPLANE OVER ENGINE-DRIVEN PUMPS

Heretofore the usual method of controlling leaf-eating insects affecting tall trees has been by the use of liquid poisons sprayed on the trees by means of engine-driven pumps, these outfits having reached their present development in the New England States in combating the gypsy and brown-tail moths and elm-leaf beetle.

However, the difficulties encountered in spraying very tall trees with liquids are legion, particularly when the trees are situated on ground so uneven that the spraying machine cannot be operated in their immediate vicinity. In such instances it is no uncommon thing to use several thousand feet of hose, and since this must be dragged about over the area under treatment, the labor cost of operating under such conditions is enormous.

Moreover, progress is so slow that it is not always possible to cover the infested area at the time when the application would be most effective from the standpoint of insect control. Dusting by airplane at least gives promise under some conditions of overcoming a few of these difficulties.

Early in the spring of 1921 the authors began seeking an opportunity to conduct a practical test of the airplane as a distributor of insecticides. In a few instances the plan was received with favor; in others it was considered a theoretical, impracticable and foolish undertaking and from many sources much good-natured chaffing was endured. Finally, however, a coöperative project was arranged with the officials of the Federal Aviation Experimental Station at McCook Field, Dayton, Ohio.

These officials entered into the spirit of the undertaking in a whole-hearted manner, giving it priority over everything in the Field for one entire day. Those chiefly concerned were: Major T. H. Bane, Director of McCook Field; Major H. S. Martin, Chief Engineer, and his assistant Mr. E. Darmoy, who designed the hopper to carry and distribute the poison and who operated the mechanism during the flights; Lieutenant J. A. Macready, Acting Chief of the Flying Section, who piloted the plane, and Captain A. W. Stevens, photographer, who made a remarkable series of photographs of the dusting plane in action.

A WAR DECLARED ON A NIGHT-FLYING MOTH

Originally it was planned to conduct the test in the spring of 1922 against the canker worm in the vicinity of Cleveland, Ohio, but almost simultaneously with the completion of plans for coöperative work with McCook Field, a much better opportunity for the test presented itself in the shape of an outbreak of the Catalpa Sphinx (*Ceratomia catalpæ* Bvd.) at Troy, Ohio, some twenty miles distant from Dayton.

The Catalpa Sphinx is, in the adult stage, a large night-flying moth which lays its

Photograph by Captain A. W. Stevens

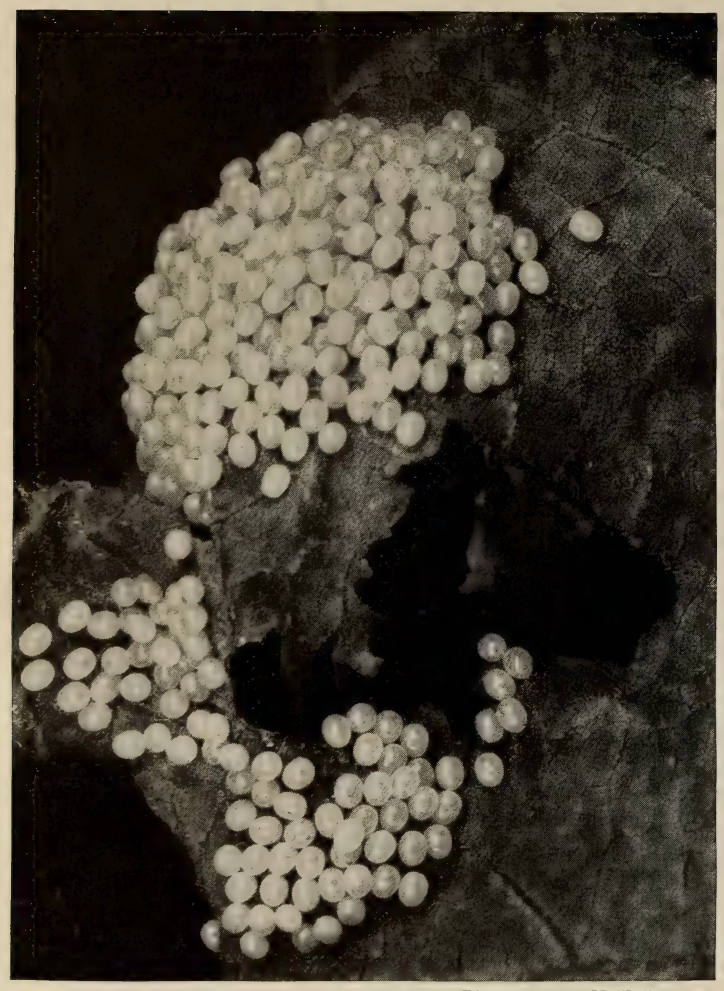
THE DUST CLOUD INVADING THE GROVE

A three-angled battle was waged for the control of the dust after the release of the poison powder from the airplane. Gravity tried to pull it down; the "booster currents" (see text, page 337) tried to toss it upward, and the surface stratum of air or wind blowing in the direction indicated by the arrow endeavored to carry it over and through the grove. The last named of the combatants won, for the entire grove was covered by the dust.

Photograph by Captain A. W. Stevens

THE DUST CLOUD OF POISON POWDER TRAVELED COMPLETELY OVER THE GROVE

The success attending the initial effort to use the airplane in fighting destructive insect pests gives rise to the hope that the method may be extensively developed.



Photograph by Y. K. Roots

THE EGGS OF THE CATALPA SPHINX (ENLARGED) DEPOSITED ON A CATALPA LEAF

Each mother moth is capable of laying several hundred eggs. As many as a thousand have been taken from a single egg-mass.

eggs in pearly white masses on the leaves of the catalpa tree. These eggs within a few days give issue to tiny larvæ which feed upon the foliage and upon reaching maturity are as much as three inches long. They then pass to the ground, burrow down about three inches and transform to the pupal stage.

From these pupæ emerge the adult moths, which proceed to lay their eggs for another brood of destructive caterpillars. Only about a month is required to pass through the stages from egg to moth.

Last year there occurred in Ohio three full broods or crops of the caterpillars, each sufficiently numerous to defoliate completely the grove in which they appeared. Some groves put out three full crops of foliage and each in its turn was wholly consumed by the ravenous worms.

Our work was directed against the second brood of caterpillars working on the second crop of foliage.

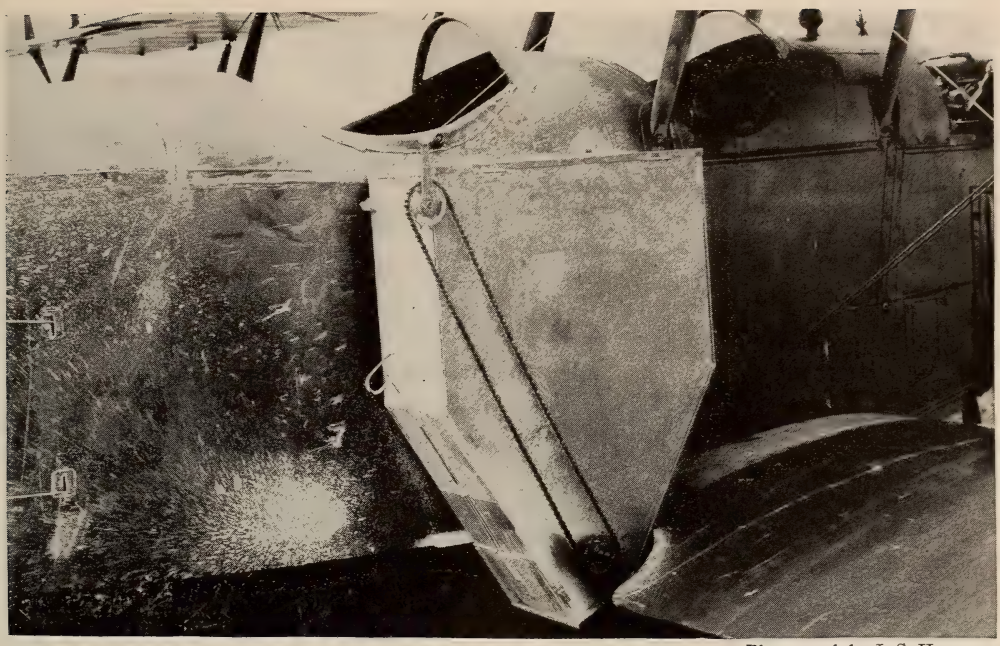
THE POISON POWDER RELEASED IN A DENSE CLOUD

The plane used was a Curtis J N 6 equipped with a hopper for carrying and liberating the poison powder. This hopper was secured to the fuselage of the plane by the side of the observer's seat. It consisted of an irregularly shaped flat metal box with a capacity for holding a little more than 100 pounds of dry arsenate of lead powder.

At the bottom was arranged a sliding gate, operated by a handle accessible to the observer in the plane. At the top of the hopper was a crank, connected by a sprocket chain to a revolving mechanism in the bottom, which when placed in motion dropped the poison powder through the previously opened sliding gate.

Immediately upon leaving the hopper the dust dropped into the "slip stream"—the violent air current set up by the revolving propeller—and was thrown into violent agitation in a dense white cloud which trailed out behind the moving plane as if the machine were on fire and belching large volumes of white smoke.

The catalpa grove in which the dusting was done was situated on level ground and had been planted for the growing of



Photograph by J. S. Houser

THE POISON POWDER HOPPER ATTACHED TO THE AIRPLANE FUSELAGE
(SEE TEXT, PAGE 336)

When the aperture at the bottom of the hopper is opened by pulling the looped wire handle upward, and the crank above is turned, the sprocket chain revolves a mechanism which throws the powder out. Upon its release from the hopper, the powder is seized by the "slip stream," the violent current of air from the propeller, and is immediately converted into a dense cloud of dust, which floats out behind the plane.

post and pole timber. It was a rectangular plot 800 feet long and 325 feet wide and contained approximately six acres. The trees, 4,815 in number, were from 25 to 30 feet tall.

The poison was applied between 3 and 4 o'clock on the afternoon of August 3, 1921, under almost ideal weather conditions. The atmosphere and sunlight were excellent for photographing and there was a steady wind varying from eight to eleven miles an hour. The direction of the wind is indicated by the arrows on the photographs.

EVERY TREE SPRINKLED WITH POISON

The plane flew at a speed of eighty miles an hour at an altitude of from 20 to 35 feet and in a line 53 yards to the windward and parallel to the grove. The dense cloud of poison dust thrown out behind the moving plane was grasped by the wind and floated through and over the grove, covering the foliage in its passage.

We feared that the dust might all settle on the trees in the immediate foreground, but to our surprise we observed that little currents of air which we termed "booster currents" were rising in the grove and these had a tendency to toss the settling dust cloud upward, whereupon it would be grasped by the wind blowing parallel to the earth's surface and thus carried onward, even to and beyond the far side of the grove.

Not a tree could be found, and many were climbed and examined, whose leaves did not bear particles of the deadly poison, easily detected by the unaided eye.

In all, the dusting plane passed the grove six times and distributed about 175 pounds of the poison. Since each passage required but nine seconds, the total time consumed in the actual work of dusting was 54 seconds, thus establishing a world's record for speed in applying insecticides to forest areas.

With a dust-liberating apparatus of greater capacity it would be possible to decrease the number of passages by the grove and thus lower still more the time

Photograph by J. S. Houser

THE ADULT CATALPA SPHINX MOTH ON THE TRUNK OF A TREE IS SCARCELY DISTINGUISHABLE

The gray-mottled wing coloring blends almost perfectly with the bark, presenting an excellent example of protective coloration.

requirement, and with experience in manipulating the plane in the application of the insecticide the amount of poison used could be reduced considerably.

POISON DUST WROUGHT HAVOC AMONG CATERPILLAR ENEMY

The outstanding feature of the application was the remarkable precision with which the poison could be placed at the point intended, thus dispelling the idea expressed by many before the test was made that the poison dust would be tossed willy-nilly by the air currents—wholly beyond control.

On the morning following the application of the dust some of the caterpillars were dead and many were ailing. Forty-six hours after the fog of dust had polluted their food, the evidences of the wholesale destruction of the insects were everywhere apparent.

Hanging on the branches and remnants of foliage, on fence posts and weeds; lying on the forest floor and secreted beneath its refuge were literally millions of the insects. Not a step could be taken without crushing numbers of them, some of which already had begun to putrefy.

Large sheets had been spread beneath the trees to record the dead caterpillars as they fell, but here again the photographic record is inadequate, for the dying insects had a tendency to use what strength remained to crawl off the sheet to die in seclusion. Nevertheless, on five square feet of one of the sheets 100 dead insects were counted.

The effect on the insects had far exceeded our fondest expectations. We had confidently believed that the smaller caterpillars would be killed, but had scarcely dared to hope that we would be able to kill the large larvæ, since it is a well known fact that the full-grown caterpillars are difficult to poison.

A careful investigation revealed the astonishing fact that not over 1 per cent of the caterpillars remained alive on the trees, and the minute observations and notes by the experts who witnessed the test preclude the idea that the destruction of the insects could be attributed to any other agency than the poison.

MAY BE ADAPTED TO FIGHTING COTTON PESTS

When one considers the success which attended the test, conducted as it was with crude apparatus and without the aid of a guiding experience in the manipulation of the machine, it seems certain that the airplane will be used successfully in the future to control forest insects.

Whether it will be possible to employ this method for the treatment of cotton or other low growing crops, or even in large fruit orchards which permit the economical use of terrestrial machines, remains to be seen. In the treatment of tall trees in park and forest areas the tremendous saving in time and labor in which its use results would seem to indicate that the method is wholly practicable.

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THE SCENERY OF NORTH AMERICA

By James Bryce (Viscount Bryce)

Author of "Impressions of Palestine," "The Nation's Capital," "Two Possible Solutions for the Eastern Problem," and "Western Siberia and the Altai Mountains," in the National Geographic Magazine

The following article was probably the last work written for publication by the distinguished scholar and statesman whose remarkable career came to a close in his eighty-fourth year, on January 22, 1922. James Bryce was a frequent contributor to the National Geographic Magazine *and an interested and helpful factor in all other activities of the National Geographic Society, on whose Committee of Research he served during his residence in Washington as the British Ambassador, his counsel and advice proving invaluable in the Society's preparation for the successful Peruvian expeditions which found and unearthed Machu Picchu, the Lost City of the Incas. Every scene mentioned in this article had been visited by Viscount Bryce, the news of whose death was received with profound sorrow throughout the United States, which he loved so well.*—The Editor.

THIRTY-FIVE years ago, when I was occupied in writing on the political and social institutions of the United States, it was a part of my plan to give some account of the scenery of North America, finding in it a feature of the country which will continue through all the ages to affect the mind of its inhabitants.

For this task, however, time failed me, while the book that embodied my political observations grew to a length that made it impossible to make room for descriptions of Nature as well as of the doings of man.

Today, invited by my friend, the Editor of the National Geographic Magazine, to a less ambitious task, that of writing something short and simple about the broad characteristics of the American scenery, I present in response to his call a few observations on those general aspects of the American landscape which have most interest for the lover of natural beauty, and especially of mountain beauty and mountain grandeur.

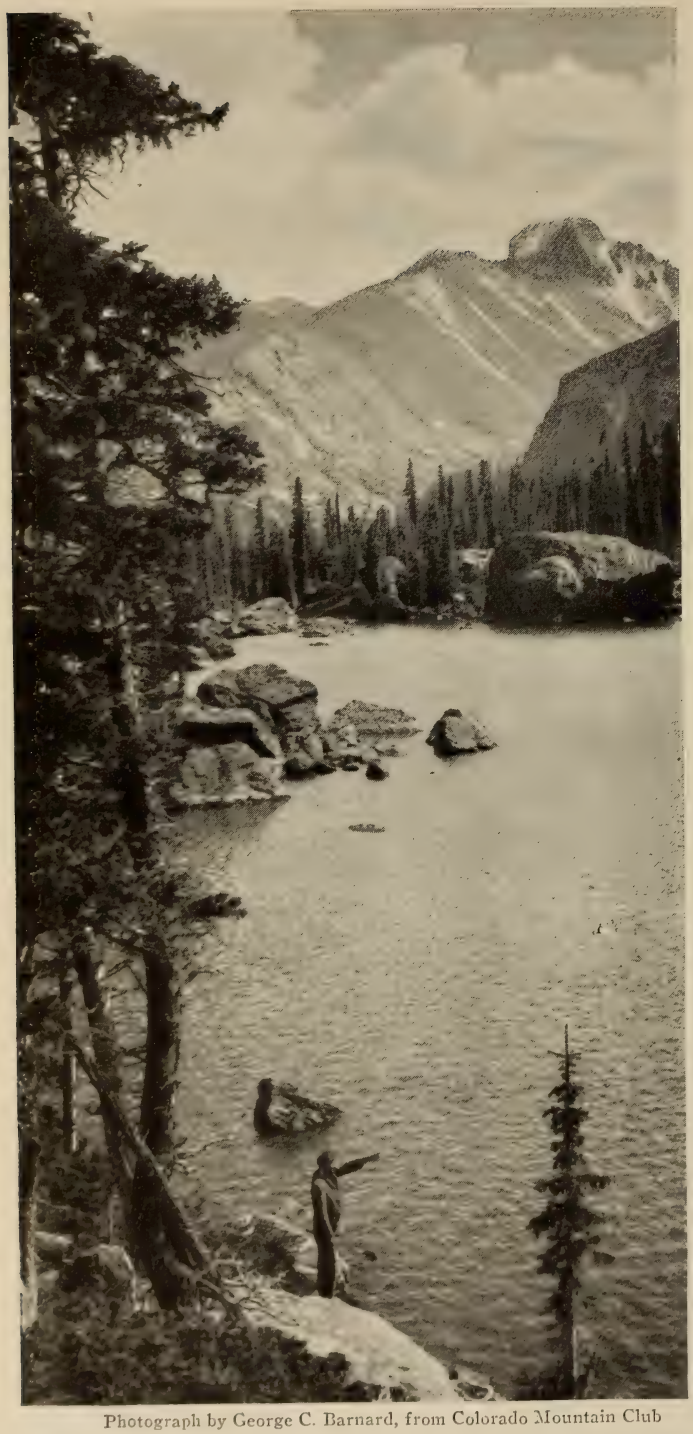
EVERYTHING IN AMERICA IS ON A GREAT SCALE

First, let me, to use the famous phrase of Alexander Hamilton, "try to think continentally."

Everything in America is on a great scale, as great as that of Asia, far greater than that of Europe, which is the part of the world whose scenery most Americans, as nearly all Englishmen, know best.

The American rivers are of immense length and volume. The lakes, or rather inland seas, are, with the exception of the Caspian, the largest in the world.

America's mountain ranges exceed those of Asia, the Rocky Mountains from New Mexico to near the frontier of Alaska being more than twenty-five hundred miles in length, as against the Himalayas of about fifteen hundred from the Indus at Attock to the point where the Tsanpo



Photograph by George C. Barnard, from Colorado Mountain Club

LONGS PEAK FROM LAKE HAIYAHA: ROCKY MOUNTAIN NATIONAL PARK, COLORADO

Lying between Hallett Peak and Otis Peak, Haiyaha is one of the most picturesque rock-bound lakes in the United States

turns south out of Tibet to become the Brahmaputra in Assam. The Alleghenies are longer than the Alps, and so are the Sierra Nevada and Cascade Mountains, practically one continuous range.

This vast scale gives a large number of places in which such beauty as rivers and mountains display can be enjoyed, but it does not necessarily make more beauty. That depends upon other factors besides that of size, the chief of which are fineness of form and richness of color.

Mountains, lakes, and rivers are the three features of scenery which most contribute to natural beauty, and of these three mountains are the most important, the quality of river scenery and lake scenery depending mainly on the character of their banks, whether these be low and monotonous or bold and varied. But before we come to the mountains, a few words may be said on the rivers, because their volume does have a grandeur of its own apart from the land through which they run.

THE GRANDEUR OF GREAT STREAMS

The two greatest American rivers, the Mississippi (including its chief affluents) and the St. Lawrence, have this grandeur. One cannot sail upon or look down from a height upon either of these two mighty streams without being awed by the pro-

digious force that dwells in their currents.

The expanse of the St. Lawrence, as it roars down the rapids above Montreal, the broad bosom of the Mississippi, with a thousand yellow eddies, as it sweeps in great curves past New Orleans, have a grandeur all their own. Neither the Nile nor the Volga nor the Obi nor the Indus conveys the same impression of resistless power. Only the Yangtze has a like air of majesty, and this may be due to the sense that it is more closely than most streams associated with human life, because no other bears so many vessels.

As respects river beauty, besides the cliffs on the upper Missouri and Yellowstone, there was fifty years ago a charming stretch of more than two hundred miles along the Mississippi between St. Paul and Dubuque, the slopes, three to four hundred feet high, covered by natural woods growing in comparatively open clumps, while the river swept in graceful curves from one to the other set of bluffs across the valley, which gradually widened as it descended from a mile to over seven or eight miles. This scenery could be enjoyed only from a vessel, and I believe that now, since there are railroads on both sides, the passenger steamers no longer ply.

Photograph by A. Haanstad, from Colorado Mountain Club

BIG THOMPSON RIVER SNAKES ITS WAY THROUGH ESTES PARK

In the background loom Deer Mountain and the Continental Divide.

Below St. Louis the heights that bound the river valley being usually lower and more distant from the stream, the banks are not very interesting. Neither are those of the St. Lawrence, except at some points, such as is Quebec.

The five Great Lakes have almost everywhere low shores, but Georgian Bay, the northeastern bight of Lake Huron, contains many picturesque rocky and wooded islands, and there are some forty or fifty miles of bold craggy heights on the north coast of Lake Superior, sometimes rising to grandeur.

But Lake Champlain is a noble sheet of water as seen from the hills of Vermont, with the Adirondack peaks rising behind it (see page 363).

The beauties of Lake George and of its very dissimilar sister, Lake Tahoe, in California, are well known.

Now we come to the mountains: They

© Asahel Curtis

LANE PEAK: MOUNT RAINIER NATIONAL PARK

The United States Geographic Board recently named this peak of the Tatoosh Range in honor of the late Franklin K. Lane, former Secretary of the Interior and for many years a member of the Board of Trustees of the National Geographic Society (see his "Mind's-Eye Map of America," in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1920).

Photograph from M. Hall McAllister

HALF DOME, A MONOLITH OF GRANITE, RISING 5,000 FEET ABOVE THE FLOOR OF THE VALLEY: YOSEMITE NATIONAL PARK

Until 1875 this peak was believed to be unscalable, but in that year George Anderson, a former sailor, succeeded in climbing it. He accomplished the feat in ten days by drilling holes and setting eyebolts in the rock. In recent years the Sierra Club of California has installed a cable stairway to the top, utilizing Anderson's method (see also illustrations, pages 344, 345, 347, and 380). Note the tree at the right, its roots anchored in granite.

Photograph from M. Hall McAllister

THE CABLE STAIRWAY, 800 FEET LONG, LEADING TO THE SUMMIT OF HALF DOME: YOSEMITE NATIONAL PARK

At the close of the summer season the steel posts are removed and stored; otherwise they would be swept away by the irresistible spring avalanches (see also illustrations on pages 343, 345, 347, and 380).

Photograph from M. Hall McAllister

CLIMBERS ASCENDING HALF DOME WITH THE AID OF CABLES

Tennis or rubber shoes are worn to prevent slipping on the smooth granite. This view also shows the heavy safety chains with which the stairway is anchored to the rock (see illustration on preceding page).

count for most, not because there is not just as much genuine beauty to be found among soft hills and rolling pastures and along the banks of streams in wooded dales, but because size is an element in grandeur, and grandeur impresses those who are insensible to the gentler charms of landscape.

FIVE GROUPS OF MOUNTAIN MASSES OF NORTH AMERICA

The mountain masses of the United States may be divided into five groups: the Rockies, the Sierra Nevada, continued in the Cascade Range of Oregon and Washington, the Coast Range of California and Oregon, the Alleghenies, and those scattered heights which extend from northern Pennsylvania to New Brunswick. To them belong the Adirondacks of New York, the Green Mountains of Vermont, the White Mountains of New Hampshire, as well as the unnamed heights of western Massachusetts (culminating in Greylock) and the loftier summits of central Maine, culminating in Katahdin.

The Rocky Mountains are the backbone of the continent, a wide belt of highlands sometimes sinking into plateaus of from 5,000 to 8,000 feet, sometimes rising into peaks which carry some snow all the year.

The highest summits are found in Colorado, where many stand pretty close together. About forty exceed 14,000 feet, but none seem to reach 14,500. This uniformity of elevation and the absence of striking forms make the Colorado groups less interesting to the climber or painter

than might be expected from their height, while the dryness of the climate prevents accumulations of snow sufficient to feed glaciers. Few have forms sufficiently noble and peculiar to give them individuality.

Thus, though the number of peaks above 14,000 feet is double that to be found in the Alps, there are none that have that striking and distinctive quality which belongs to the Matterhorn, the Weisshorn, the Finsteraarhorn, and Schreckhorn, or even to lower peaks such as the Venediger Spitze, the Cimone della Pala, and the Sasso di Pelmo.

Pikes Peak, Colorado, the high point most conspicuous from the plains, and toward which, as a landmark visible far off to the east, many of the early settlers were directing their wagons seventy years ago, is a singularly tame and featureless object. Though the trees scattered over those rolling grassy uplands called the prairies give an element of beauty, the dry climate stunts the growth of forests and prevents them from enriching the landscape with sufficient verdure and variety.

COLORADO'S VALLEYS UNSURPASSED IN GRANDEUR

Along with these defects, however, the Colorado Rockies have one feature of unsurpassed grandeur. What the hills do not give is given by the valleys. The deep and extremely narrow ravines which intersect the mountains, enclosed by precipitous walls thousands of feet high, with nothing at the bottom but a roaring stream and sometimes a road, or a railway carried on a shelf cut out of the face of the precipice—these have sometimes a grandeur and sometimes a picturesque variety of views up and down the winding glen unsurpassed in any part of the Western Hemisphere.

The so-called Royal Gorge of the Arkansas River, just where it issues from the mountains west of Pueblo, is perhaps the most tremendous in the sternness of its crags and pinnacles, but there are others hardly less wildly grand.

North of Colorado the range of the Rockies sinks, but some high peaks occur in northwestern Wyoming, and the scenery of the Yellowstone Lake and Yellowstone Canyon, with its splendid waterfalls, as well as that of the Geyser Basins, is extremely interesting.

Still further north, on the frontier line between the State of Montana and Canada, lies a district of great beauty, with snow-covered peaks, occasionally bearing small glaciers and picturesque lakes filling some of the valleys. Here the creation of a national park has happily provided for the preservation both of the scenery and of the wild animals.

From this point, where the Canadian Rockies begin, the tourist finds plenty of fine scenery for hundreds of miles to the north. The mountains do not reach the height of those in Colorado, but as the rainfall is heavier and snow-line is much lower, considerable glaciers appear, and the mountain forms are much bolder and more varied. Here the forests are denser and the streams fuller, especially on the west side of the range, which receives more rain.

All this region north of the Canadian Pacific Railway is still very imperfectly explored and offers to climbers the chance of discoveries, together with ample scope for dangerous rock and ice work—forms of enjoyment now fashionable. Its scenery resembles that of the Alps more nearly than does any other part of North America.

THE CANYONS OF THE WEST

From the Rockies let us turn westward across the Great American Desert to the parallel range of the Sierra Nevada in California. As its name conveys, it carries perpetual snow, but not enough snow to support glaciers, though these may be found in its prolongation into Oregon and Washington, where it bears the name of the Cascade Range.

Like the Rockies of Colorado, it has one or two summits exceeding 14,000 feet, but none reaching 15,000 feet; and, like them, it displays few peaks conspicuous by any nobility or grace of form. Seen from the wide valley or plain of central California on the west, the skyline of the range is of nearly uniform height and disappointingly tame.

The canyons, however, are of extraordinary beauty, sometimes, as in the Yosemite Valley and the Kings River Canyon, presenting forms of singular grandeur.

Photograph from M. Hall McAllister

THE OVERHANGING LEDGE AT THE SUMMIT OF HALF DOME: YOSEMITE VALLEY

The flag and steel pole are nearly 5,000 feet above Mirror Lake, which lies at the base of Half Dome.

Photograph by Haynes, St. Paul

TRANSFERRING TO CANVAS SOME OF THE UNSURPASSED BEAUTIES OF GLACIER NATIONAL PARK

At the artist's feet stretches the mirror surface of Lake McDermott, which reflects the towering grandeur of Mount Wilbur in the distance. Note the white tents of summer visitors in the middle distance.

It would be hard to find anywhere scenery more perfect. Lofty vertical walls of gray granite inclose a valley from half a mile to a mile wide, on whose level grassy floor tall trees rise along banks of an exquisitely clear-watered, gently flowing river. Waterfalls fling themselves over the edges of the cliffs (see page 349).

MAJESTY OF PRECIPICE AND BEAUTY OF VALE COMBINED

The majesty of the precipices combines with the soft beauty of the vale to produce an effect such as it would be hard to find anywhere in Europe, though perhaps the Romsdal in Norway and the Val di Genova in the Italian Alps northeast of Brescia come nearest. In the latter, however, the scale is smaller, while the grim sternness of the Romsdal is not relieved by trees and meadows basking in sunshine like that of the Yosemite, even among its mountains. California remains a sunny land.

In Oregon and Washington the monotony of the outline which the average level of the Cascade Range presents (about 6,000 to 7,000 feet) is broken by

Photograph © Albert Schlecten

THE GREAT FALLS OF THE YELLOWSTONE: YELLOWSTONE NATIONAL PARK

This majestic cataract marks the beginning of the Grand Canyon of the Yellowstone, which extends for twenty miles between walls of gorgeous coloring, ranging in height from 600 to 1,200 feet. The water of the Great Falls makes a plunge nearly twice as high as Niagara.

several huge snow-capped summits, the finest of which are Mount Hood, well seen from the city of Portland, and Mount Rainier, south of Seattle. Seen from the opposite or western coast of Puget Sound, Mt. Rainier is a truly magnificent object, towering to a height of 14,408 feet, with glittering glaciers streaming down its slopes till they almost touch the thick dark forest beneath—a vast forest, impenetrable, except where trails have been cut, in which nearly every tree, Douglas firs and so-called "cedars" (*Thùja gigantea*), rises 300 feet into the air.

These superb evergreen conifers, along with the two *Sequoias* of California, the one (the Redwood) the tallest and the other (the so-called "Big Trees" of the Yosemite and Sequoia National Parks) the thickest-stemmed trees in the world,* are the glory of the Pacific coast not only

* Except, perhaps, the "Water Cypress" (the native Ahuehuete) of Mexico, the stem of which is not tall, but of prodigious girth.

Photograph by N. H. Darton

WHERE BEAUTY AND GRANDEUR ENHANCE ONE ANOTHER: GRAND CANYON NATIONAL PARK

Looking into the depths of the Grand Canyon and to the far-distant northern brink, opposite Pima Point. The river, more than 500 feet wide here, is over a mile below the Indians (see text, page 370).

Photograph from George F. Paul

AT THE "SADDLE" ON THE PIKES PEAK COG ROAD

This summit of the Rockies, conspicuous from the plains to the east, was a landmark for the early settlers westward-bound seventy years ago.

Photograph © Asahel Curtis

COASTING IN PARADISE PARK, MOUNT RAINIER NATIONAL PARK: WASHINGTON

Though not so widely exploited, the United States in many sections from East to West has winter sports as picturesque as those of Switzerland.

Photograph © Asahel Curtis

IN A WASHINGTON STATE WHEAT FIELD

in their size, but also in the stateliness of their aspect, far transcending any trees of Europe, and approached only by a few in Australia, in tropical South America, and in the islands of Further India.

BEAUTY IN THE FOREST-CLAD SLOPES OF THE EAST

From these western peaks and forests let me lead the reader back to those of the Atlantic side of America, where also we shall find another type of scenery with its own peculiar charms, less sensational, but not less enjoyable by those who know how to enjoy.

The Appalachian mountain masses are as unlike the mountains of Colorado and California as they are unlike those of Europe, for, though they are in the same latitude, climate and vegetation as well as rock-structure are different.

In the Alleghenies there is nothing to suggest the Alps or the Pyrenees or the Caucasus, but sometimes one is reminded of the Swiss and French Jura. They are, when one crosses them from east to west or west to east, a succession of smooth-topped ridges, generally parallel to one another, but with transverse ridges here and there, the average height above sea-

Photograph © C. R. Miller

CHASTE SHASTA ADMIRES HER IMAGE IN GRASS LAKE

This snow-covered pile, which rises to a height of 14,162 feet in northern California, is the cone of an extinct volcano. Its northern slope is seamed with minor glaciers.

TORREY PINES FRAME THIS CALIFORNIA LANDSCAPE

This tree (*Pinus Torreyana*) is said to be found in but two places in the world—here and on Santa Rosa Island. The scene is on the Coast Route, State highway, near San Diego.

Photograph by Herbert W. Gleason

TUOLUMNE MEADOWS, FROM JUNIPER CREST, YOSEMITE NATIONAL PARK

"The widest, smoothest, most serenely spacious, and in every way the most delightful summer pleasure park in all the High Sierra."—JOHN MUIR.

level 3,000 to 4,000 feet, the highest top (in North Carolina) rising to 6,711 feet (see page 358).

The valleys between them are usually some miles wide and all of the valley bottoms, as well as the slopes that are not under cultivation or pasture, are covered with dense wood. Here and there a long line of limestone crags runs along the mountain side for miles, its gray or bluish hue showing well against the rich woods above or below.

There are not many outstanding summits, for the ridges usually maintain the same level for many miles, so that the wayfarer might, if trails were cut along the ridge tops where the ridges are not above the timber-line, walk or ride for long distances with little ascent or descent, looking down upon the country on each side.

The lines are soft, and the scenery might be called monotonous were it not for the beauty of the forests, in which there is much variety, for in some places evergreen conifers clothe the higher slopes, while deciduous trees predominate below, prominent among them the tulip tree, with its tall, straight trunk rising like a stately column, sometimes for 60 or 80 feet to the point where it begins to throw out branches.

The superb colors which these woods take in October are chiefly due to the scarlet maples, mingled with the yellow tulips. In June the rhododendrons, abundant in many districts on the upper slopes, provide a mass of pink and purple glow comparable to that which their Himalayan sisters give to the traveler in Sikkim or Nepal.

There are no lakes and the streams, rippling or murmuring along channels mostly embowered in wood, play no great part in the landscape, though now and then, as along the course of the river

Photograph from E. O. McCormick

A JAGGED SKYLINE NEAR FISH CREEK, ARIZONA

called French Broad, in North Carolina and East Tennessee, they break into a series of picturesque rapids.

MOUNTAIN MASSES OF NEW ENGLAND DIFFER FROM THE ALLEGHENIES

The Appalachian mountain masses of New York and the New England States are quite unlike the Alleghenies in their scenic character. There is hardly any limestone. The rocks are mostly gneiss or granite or slates and mica schists, very old and very hard.

The aspect of the heights is rougher and sterner and the timber-line lower, so that the ground above 4,000 feet is usually open and bare, while above 5,000 feet it is often covered by loose rocks, decomposing under the storms of spring and fall. Yet the hardness of the rocks gives few striking forms and the slopes are seldom precipitous, for this whole region has been worn down by the huge glaciers which formerly covered it, rounding off the protuberances and carving out the valleys.

Mount Washington, the highest point, and its fellow-summits of the so-called "Presidential Range" in New Hampshire are huge masses, breaking down steeply here and there into glens and into those deep semicircular hollows which the Scottish Highlanders call "corries," but rarely showing either a prominent peak or an imposing precipice.

It is only in such precipices as these are that the rock-climber finds his chance, for there are no spiry pinnacles or narrow arêtes to test his powers of clinging to a smooth and narrowing pillar of granite or of executing a sort of tight-rope "stunt" by creeping along a knife edge of rock. Neither are there deep and narrow gorges like the canyons of Colorado and Utah.

A QUIET BEAUTY IN THE VALLEYS OF NEW ENGLAND

But the valleys have a quiet beauty into which one joyfully descends from the rugged stone-strewn wastes above. It would be hard to find anywhere a lovelier

Photograph © Herbert W. Pelton

VANISHING STORM-CLOUDS VIEWED FROM MOUNT MITCHELL, NORTH CAROLINA

With an elevation of 6,711 feet, Mount Mitchell (also called Black Dome) is the highest peak in the United States east of the Rocky Mountains (see text, page 356). Professor Elisha Mitchell, for whom the mountain is named, lost his life while determining its height in 1857. He is buried on the summit

Photograph by J. D. Hunting

THE UNDULATING LINE OF THE WHITE MOUNTAINS FROM INTERVALE, NEW HAMPSHIRE

"It would be hard to find anywhere a lovelier landscape, in quiet style, not thrilling, but sweet and soothing, than that of Intervale, above North Conway, in New Hampshire" (see text, page 366).

Photograph by Kalkhoff Company

MOOSEHEAD LAKE, MAINE, FROM MOUNT KINEO

The lakes of New England and of northern New York are among the chief scenic charms of eastern North America.

THE PEACEFUL VALLEY OF THE CONNECTICUT VIEWED FROM MOUNT HOLYOKE

"The valleys have a quiet beauty into which one joyfully descends from the rugged stone-strewn wastes of the Presidential Range" (see text, page 357).

Photograph by United States Army Air Service

AN AIRPLANE VIEW OF THE UNITED STATES NAVAL ACADEMY, ANNAPOLIS, MARYLAND

Charmingly situated near the mouth of the River Severn, the capital of Maryland has one of the most picturesque locations of the middle Atlantic seaboard.

THE PARAPET OF FORT TICONDEROGA, OVERLOOKING LAKE CHAMPLAIN

"Lake Champlain is a noble sheet of water, as seen from the hills of Vermont, with the Adirondack peaks rising behind it" (see text, page 341).

Photograph by Ernest Fox

THE HORSESHOE FALLS OF NIAGARA IN SUMMER

Since American pioneers first gazed in wonder and admiration upon these falls, the greater cataracts of the Zambezi, in South Africa, and those of Kaieteur and Iguazu, in South America, have been discovered, but Niagara remains one of the scenic marvels of the natural world.

Photograph International Film Service

WHEN WINTER CRYSTALLIZES NIAGARA'S MISTS

While Viscount Bryce deplores the diversion of some of the waters of Niagara to utilitarian uses (see text, page 369), the mighty cataract is still the pride of our North American scenery east of the Rockies. When the waters are frozen and huge hillocks of ice cover rocks and river, it is even more impressive than in summer.

Photograph by C. Wharton James

A DESERT WATER-HOLE IN ARIZONA

landscape, in a quiet style, not thrilling, but sweet and soothing, than that of Intervale above North Conway (in New Hampshire), near which, under the bold ridge of Chocorua, the honored and beloved philosopher, William James, used to spend his summers (see page 359).

The lines of the hills descending one behind another, fainter and fainter as they recede into the level dale through whose meadows a clear stream meanders, blue or dark gray rock falls showing here and there through the thick hillside woods, clusters of houses giving a human touch to the scene, and in the far distance the snow-tipped top of Mount Washington—these make up an unforgettable picture.

Prospects of like character recur every few miles as one journeys northward up the long stretch of the Connecticut River Valley between New Hampshire and Vermont (see pages 359 and 361); nor are they wanting among the wooded hills of western Massachusetts.

The visitor from northern or central Europe is surprised to find that he cannot roam at will over these hills, not that any game preservers stop him, but because there is little open grassy land upon the middle and higher slopes, only thick woods untraversible except by the few trails. The wood is seldom cut except where it is easy to drag or float to a railroad, so high is the cost of labor.

SUMMER CAMPERS FROM THE CITY FREQUENT NEW ENGLAND GLENS

Thus upland pastures, enlivened by the cattle and chalets, such as those which delight us in the Alps and Pyrenees and Jura and the German Schwartzwald, are wanting. Here and there one comes on a farm deserted by a family which has gone West, the barn falling to pieces, but the orchard still bearing apples which no one comes up to gather; it is only the summer campers from the cities that wander up the glens and on to the bare, windswept heights.

A wide view is always interesting and suggestive, but the prospects from these mountain tops want the variety of those the climber enjoys in Scotland and Wales and in the hill regions of central Europe. Here the eye ranges over a vast expanse of high country, mostly either bare and

Photograph by George H. Harvey, Jr.

CROSSING THE GREAT DIVIDE IN MIDSUMMER

The snow lies deep at the end of June on Flattop Mountain, one of the peaks in the Rocky Mountain National Park, Colorado.

rocky above 2,500 feet or thickly wooded lower down, with scarce any upstanding peaks to fix the eye.

It is rather in the valleys that the characteristic charm of New England scenery is to be found. The villages are pretty, despite the unlovely frame houses, for they are surrounded by elms, more graceful with their pendent boughs than are the elms of England, and the stately maples line the streets and lanes. Every house has its wide, well-kept grass plot, open to street or road, and the whole village seems to swim in verdure.

The lakes of New England and northern New York must not be forgotten, for some of them, like Moosehead Lake in Maine, have a wild, and others, like Lake George and the Saranacs, a soft and placid beauty. But none of them, not even Lake Champlain, can be ranked with the lakes of Switzerland and Austria, still less with those of North Italy—Maggiore, Como, and Garda.

I have left to the last the supreme charm of East American scenery. It is a charm to be enjoyed only during six weeks in the year, from the beginning of October to the middle of November, during the "Indian Summer," a season scarcely known to Europe except in middle Italy and Greece.

A WEALTH OF COLOR IN THE WOODS

The later part of the fall gives to the woods a wealth of brilliant color nowhere to be found in the Old World, unless perhaps in Korea and Japan. It is chiefly in the maples that these colors are found, for they turn to superb crimsons and scarlets, but they are seconded by the many-tinted yellows of beech and birch, while white pines, interspersed among the deciduous trees, with their deep yet tender green, less dark than that of the Scotch fir, present a contrast against which the maples glow all the more vivid.

The loveliest hues of English woodlands in May, such as one sees there in the valleys of the Wye, hues more delicate than those of autumn, make no such impressions of Nature's resources as do

Photograph by J. Smeaton Chase

AMERICA'S SAHARA, THE COLORADO DESERT, WITH MOUNT SAN JACINTO (10,805 FEET) IN THE DISTANCE

"The American deserts are adorned with some noble, isolated mountain groups besides the masses of the Rockies and the Sierra Nevada which bound them on the east and west."

the forests of eastern America. To see these colors anywhere between Carolina and Canada, but best perhaps among the lakes of Maine, is worth a voyage across the Atlantic. The hillsides seem ablaze with them, a piece of Nature's most exquisite handiwork, yet they are not violent or crude, no more than is the finest Cashmere shawl or Persian rug.

These beauties are in no danger, like so much of the world's beauty, of perishing at the hands of man, for the woods have not sufficient economic value, at least where they are far from a railroad, to render it profitable to turn timber into lumber.

THE COAST LANDSCAPES OF AMERICA

The scenery of sea coasts makes so large a part of what the American visitor finds to attract him in Ireland, Scotland, and Norway that a passing word ought to be given to the coast landscapes of America (see page 384).

The Atlantic shores are low for thousands of miles, all the way from New York to the Mexican frontier, and may be left out of account, though there are pretty bits among the "keys" on the coast of Florida. It is therefore only the New England coast from Long Island Sound to the Bay of Fundy that comes into the sort of inventory I am trying to make of the scenic wealth of the continent.

Most of this northeastern coast is well known. Newport and Cape Cod and the north shore of Massachusetts Bay and the "Islets of the Pointed Firs" that fringe the deeply indented shores of Maine are too familiar to need description, and no one who has ever looked out from the highest hills in Mount Desert Island on the wonderful sea and landscape of "promontory, creek, and bay," with its winding channels and rockbound isles, can ever forget its enchanting variety.

NIAGARA NEEDS NO WORD

Neither need Niagara be spoken of. Fifty years ago it was the great natural wonder of America which every European traveler made it his first pleasure to see. Since then the falls of the Zambezi, in South Africa, and the falls of the upper Paraná (Iguazu), in South America, the former higher and the latter wider than Niagara, have become well known, and in the United States the Yellowstone Geysers and Grand Canyon of the Colorado River vie with it as marvels of Nature.

Moreover, another thing has happened: Niagara has suffered at the hand of man. An unlovely suburb of the town has grown up on the American shore, and the cliff on that side is defaced by small spouts of water spurting out from holes pierced in the rock connected with the channel constructed for the power plant.

Worst of all, the flow of water over the two great falls has been diminished, and is now distinctly thinner in the American fall than it was in 1870. One who remembers the scene as it was in that year sees it now with a sense of sad regret. One wishes that it had been possible to preserve so exquisite a picture as the banks clothed with natural wood, the majestic torrent of bright green water, bright and clear as crystal, pouring over the precipice into the seething whirlpools beneath, as presented to the first explorers (see pages 364 and 365).

Whether the gain to the companies that have developed the electric power and to the Canadian communities that have utilized it for electric railways, doubtless to the convenience of the public, has been worth the loss of much of the delight which the falls gave to the two nations, is a question not to be examined here.

AMERICAN DESERTS SURPASS IN BEAUTY THOSE OF AFRICA

It remains to speak of one other feature, and that not the least remarkable, of North American scenery—the Great Deserts. They fill parts of the States of California, Colorado, New Mexico, Wyoming and Idaho, most of Utah, nearly all of Arizona and Nevada, in the last of which the population is less than one inhabitant to the square mile and is not likely to increase unless new mines of silver or copper are discovered (see pages 366, 368, 372, 381, and 386).

The American deserts are more beautiful than those which I have seen in North Africa or North Arabia (except, indeed, in the Sinai Peninsula) or in South Africa or western South America or Ice-

land. Of the Mongolian and Australian deserts I know only the fringes.

The wildernesses which a number of my readers are most likely to have seen are those between which lies that long, narrow, winding strip of cultivated land which the Nile redeems from aridity and which Virgil calls Green Egypt. To the west of Egypt the Libyan desert, a part of the Sahara, is generally, like that behind Tripoli, flat, with low rocky hills here and there and (except at sunrise and sunset) a dull and dreary stretch of brown.

But the American deserts are adorned by some noble isolated mountain groups besides the masses of the Rockies and the Sierra Nevada which bound them on the east and west. Such are the St. Francis Mountains in northern Arizona, clothed with snow for a large part of the year.

Such, further to the south, are some bold, sharp groups of peaks along the line of the Southern Pacific Railway. These heights, mostly standing detached and visible at long distances in the extraordinarily dry, clear air, give a striking impression of desolation and remoteness. They seem out of all relation to the life and work of man.

Here even a hermit could not support life in a cave. No water, no reverent admirer to bring him food, as the ascetic Buddhist walled up in a crevice of the rock is fed by the offerings of the pious. These mountain forms are almost terrible in their hard blaze of sunlight that sharpens their outlines.

THE SECRET OF THE CHARM OF DESERT SCENERY

But the peculiar charm of the desert, scarcely appreciable by those who have not seen it, lies in the combination with barrenness and the sense of lonely immensity which the wide range of vision gives, the most tender and delicate tints of color. In Arizona especially the varieties of rock and the inequalities of surface, scattering patches of light and shadow over the expanse, give corresponding varieties of hue, so there is no monotony, not even at high noon, when other deserts have a uniform glare, be their surface black or brown or gray.

But it is when the sun dips toward the horizon that the magic of light has its most perfect work, bringing out a whole range of tints vivid, yet delicate, for which we have no names, for they pass by faint gradations from pink to crimson and crimson to purple and purple to violet.

Every stone seems to glow like a jewel before it dies into darkness as the sun departs, while the distant violets of a limestone cliff turn to the gray of twilight. Night falls. There are no small birds to twitter, no owls to hoot; but the melancholy cry of the small desert wolf (the coyote) is heard through the silence.

TWO UNFORGETTABLE DESERT VIEWS

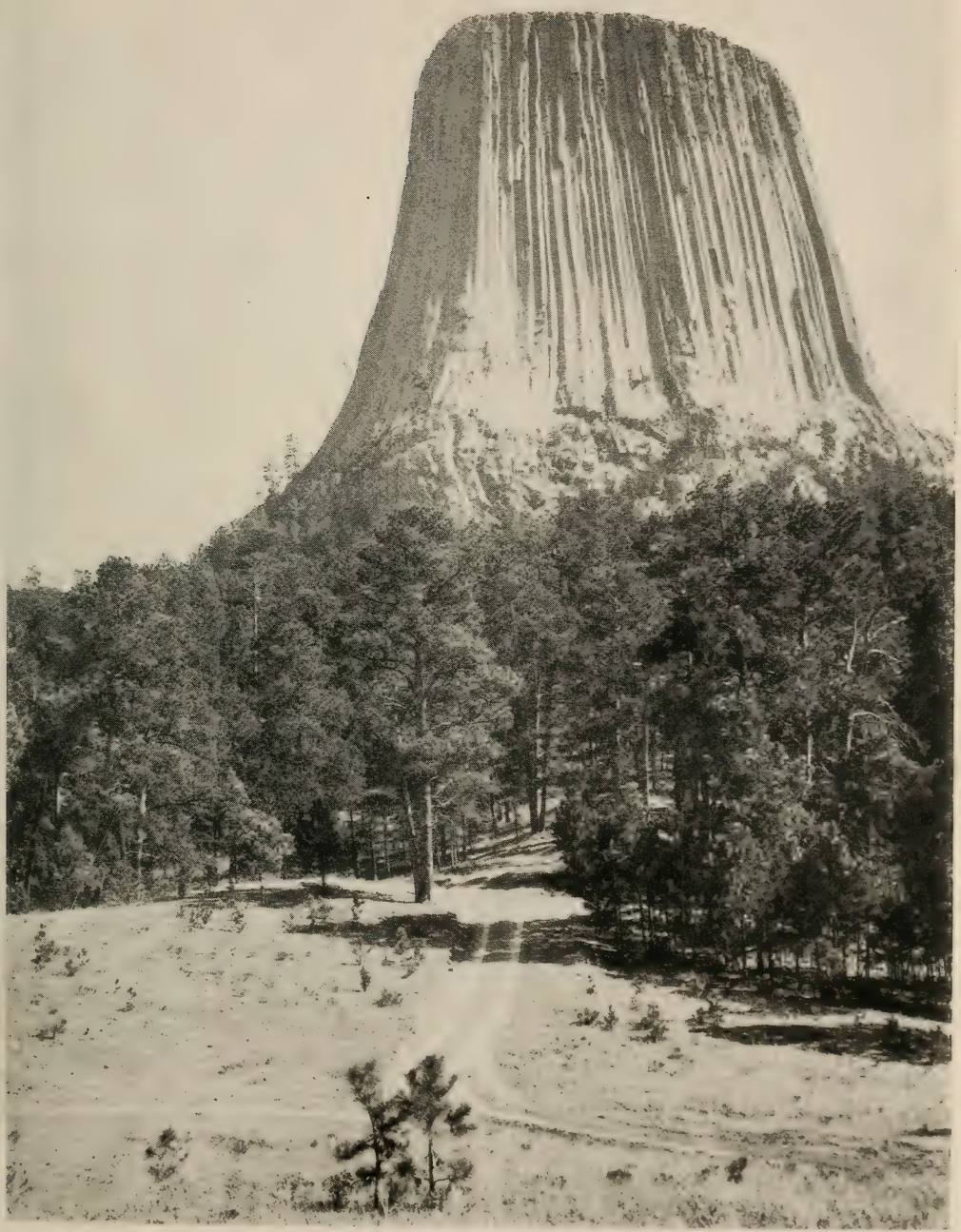
Two desert views rise to my memory as splendid in their amplitude. One is that from the hill behind Salt Lake City, where there used to be—perhaps is still—a military post. In the foreground beneath is the city, its suburbs so well planted as to seem encircled by and embowered in trees, though trees grow only by the help of irrigation. Beyond it, westward, are the shining levels of the Great Salt Lake, and beyond them lofty peaks, with desert valleys running up between among the distant ranges that fade away, line behind line, to the north, west, and southwest.

This view, best seen in the afternoon, is worthy of the brush of Claude Lorraine or Turner.

The other prospect is that over the Painted Desert in Arizona, looking north and northeast from a point above the Grand Canyon, some twelve miles east of the railway station at the Bright Angel Trail. Here one gazes over a far-stretching plain, dotted here and there with rocky eminences and with mysterious snow-tipped mountains in the dim distance.

Dark spots of vegetation, coniferous trees that can live even in this arid land, alternate with rock faces of red and yellow, and the sense of vast space is heightened by the innumerable varieties of color. One longs to wander among the deep canyons that seam this wilderness, each with its own labyrinth of crags and tumbled rocks.

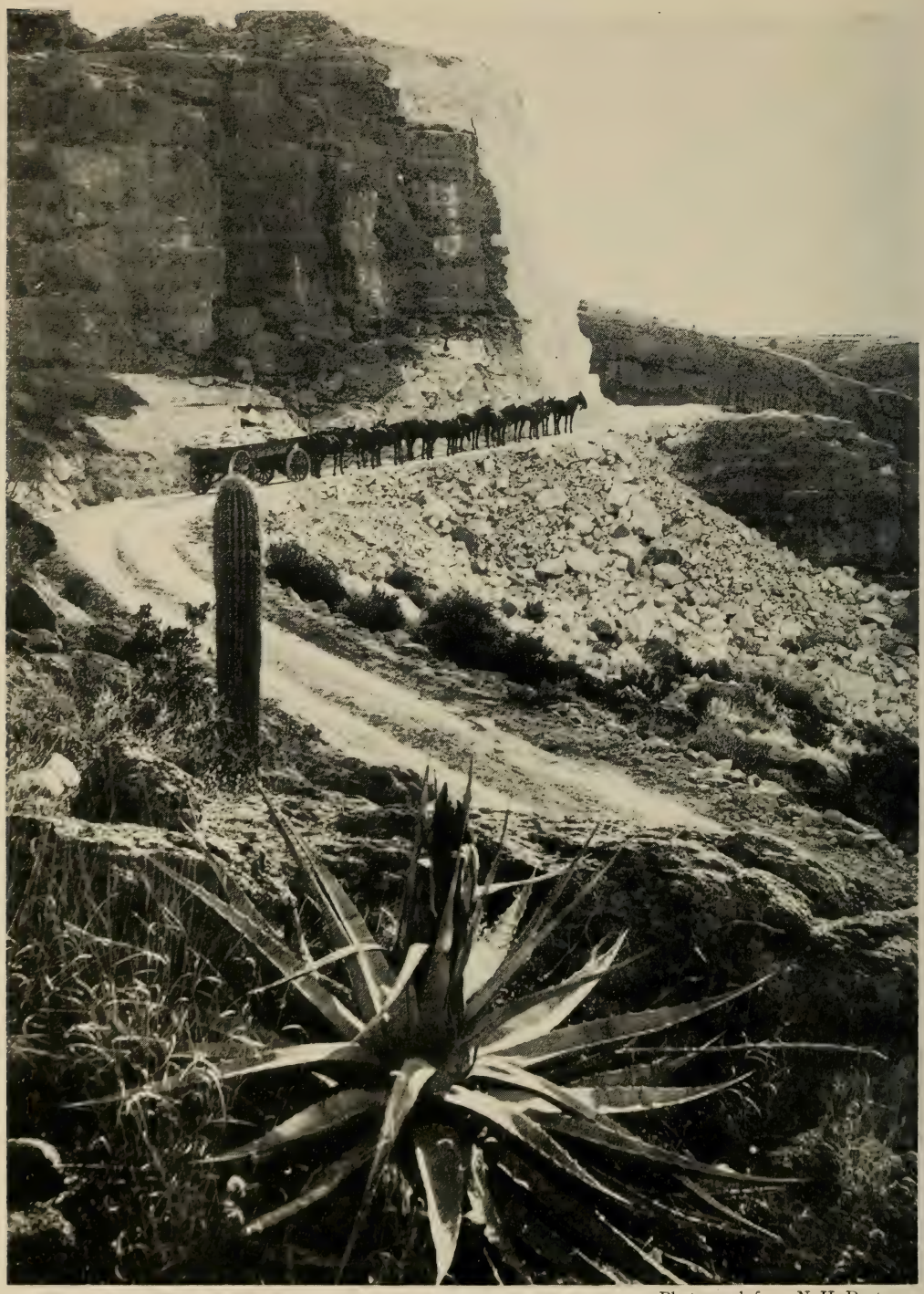
Having now reached the edge of the Grand Canyon, I must devote a few sen-



Photograph by Dick Stone

DEVILS TOWER, AMONG THE BLACK HILLS OF WYOMING

Indian legend thus accounts for this natural wonder: While gathering wild flowers, three Indian maidens encountered three bears. The girls fled to a large rock, which began to grow. As the bears climbed in pursuit, the walls rose higher and higher, until at last the beasts fell to their death, while the maidens eventually perished from hunger, being unable to descend the cliff-like walls. The marks of the bears' claws can be seen to this day on the tower! It has been set aside as a national monument.



Photograph from N. H. Darton

THE TOP OF FISH CREEK HILL, ON THE ROAD FROM PHŒNIX TO ROOSEVELT, ARIZONA

Photograph from E. O. McCormick

SPECTACULAR AMERICAN DESERT VEGETATION: A GIANT CACTUS OF ARIZONA

THE LONG, LONG TRAIL WINDING THROUGH THE MAGNIFICENT MOUNTAIN PARKS SYSTEM OF COLORADO

AN OUTPOST CABIN AT THE END OF ONE OF THE TRAILS IN THE BEAR LAKE REGION: ROCKY MOUNTAIN NATIONAL PARK

Photograph by George L. Beam

THE GRAND CANYON OF THE COLORADO FROM BRIGHT ANGEL POINT, NORTH RIM : GRAND CANYON NATIONAL PARK

"Such a display of rock colors, laid out like bands of blue and yellow and red on a ribbon and stretching for hundreds of miles, is seen nowhere else in the world" (see text, page 387).

Photograph by George L. Beam

ANGEL'S LANDING IN ZION NATIONAL PARK, UTAH

Created a national park in 1919, this canyon is one of the scenic wonders of America. Most of its cliffs are of a gorgeous red hue for two-thirds of their height, the remaining third being a glistening white, while some of the white-top towers of stone are capped with crimson (see also page 382).

BOATING ON TWO MEDICINE LAKE, GLACIER NATIONAL PARK

Photograph by E. O. McCormick

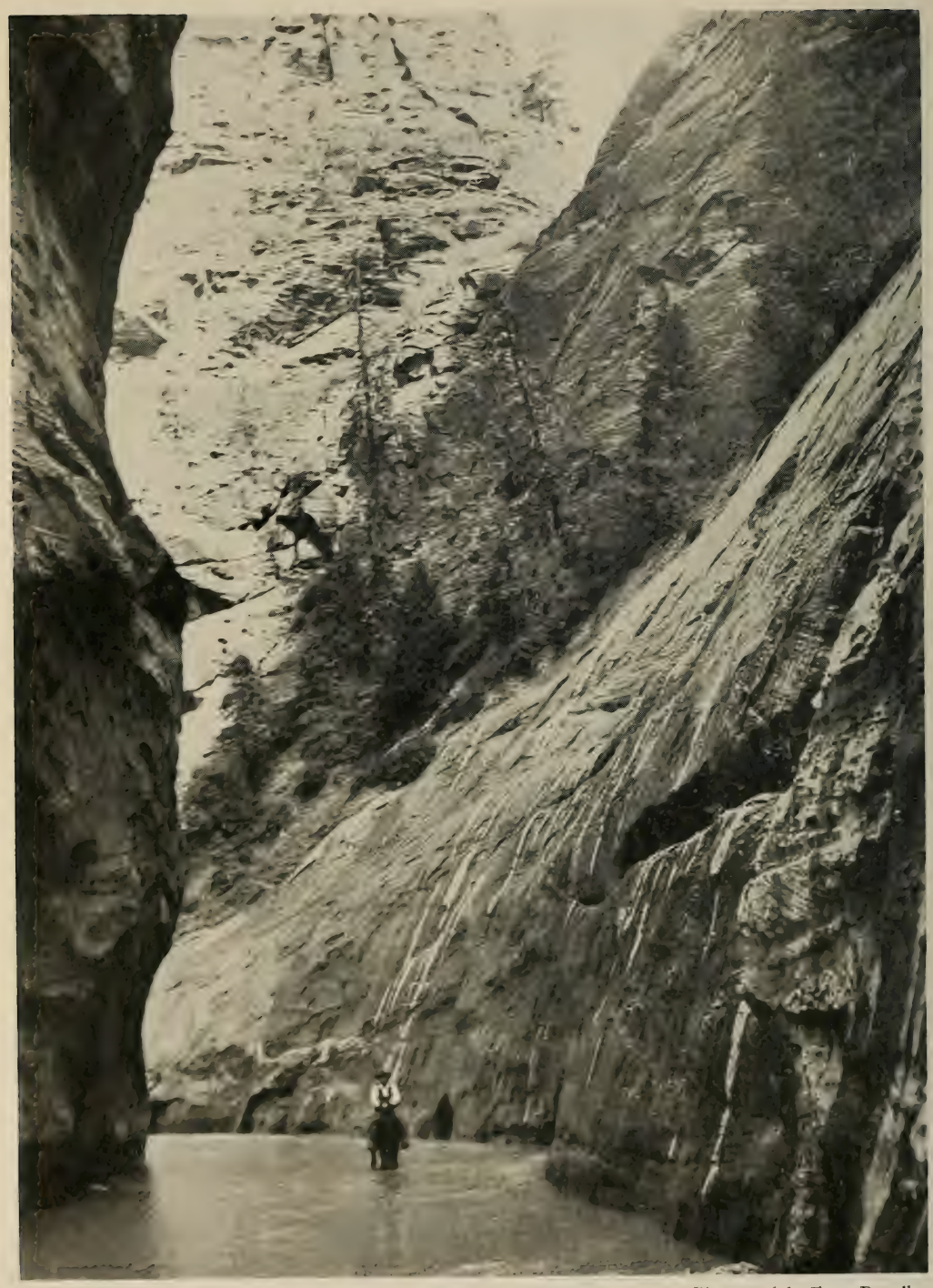
ROOSEVELT DAM, WHOSE WALL, 280 FEET HIGH AND 1,080 FEET LONG, IMPOUNDS THE WATERS OF SALT RIVER, ARIZONA

Photograph by Pillsbury Picture Co.

WHEN THE WHITE SHROUD OF WINTER ENVELOPS HALF DOME: YOSEMITE NATIONAL PARK (SEE ALSO ILLUSTRATIONS, PAGES 343-347)

Photograph by Lloyd Cooper

EVENING PRIMROSES IN FULL BLOOM AT EASTERTIDE ON THE COLORADO DESERT (SEE ALSO PAGE 368)



Photograph by Eyre Powell

THE WET TRAIL THROUGH THE NARROWS: ZION NATIONAL PARK

The bestowal of picturesque names is a familiar practice in America's national parks, and one of the most appropriate of these is "The Rainbow of the Desert" given to Zion Canyon, whose water-carved sandstone cliffs present brilliant contrasts in color. This canyon was known to the Mormons as early as 1861, when Brigham Young recognized it as an admirable place of refuge for his sect in the event of attack (see also illustration on page 377).

CHASM LAKE, IN THE SHADOW OF SNOW-CROWNED LONGS PEAK, COLORADO

King of Mountains is the royal title given to Longs Peak, the most striking summit of the Snowy Range, in Rocky Mountain National Park, one of the country's playgrounds which is distinguished by its profusion of glacier-watered valleys, with their luxuriant groves of white-stemmed aspens and dark-leaved pines (see also illustration on page 340).

Photograph by H. Armstrong Roberts

SURF CASTING ON THE ATLANTIC COAST

NOT A CARE IN THE WORLD!

Photograph by George Dock

ON THE DESERT TRAIL, OVER WINDSWEPT POLISHED ROCK, TO RAINBOW BRIDGE, UTAH

tences to that unique wonder of the world (see pages 350 and 376).

THE GRAND CANYON, UNIQUE WONDER OF THE WORLD

This gorge of the river Colorado, many hundreds of miles long, is most accessible at the point to which a branch railroad has been built. Here the canyon is 6,000 feet deep and about 12 miles wide from the one edge to the other of the gulf which the swift torrent has excavated, cutting its way down through successive lines of horizontal strata, sandstones, white, yellow, and red, and limestones, gray and blue.

At the bottom one finds the primeval rock, a hard, red porphyry, on which all the sandstones and limestones were deposited during the untold ages that elapsed before these strata were raised to form dry land. Thereafter began that process of cutting down through the strata which has already lasted for countless centuries and is still in progress.

Wonderful are the colors of these strata, superimposed one upon the other, and they stand strongly out, for in this dry air no mosses or lichens cling to their precipitous faces.

On each side of the main canyon comparatively short, narrow gorges have been carved out by streams when a sudden storm has flooded the plateau behind and forced the water to discharge itself into the great canyon.

Round the upper parts of these secondary canyons, which have hollowed out semicircular recesses or cirques in the line of the Grand Canyon, the horizontal strata of the Grand Canyon are continued, prolonging what we might call the decorative scheme of color up their recesses.

Such a display of rock colors laid out like bands of blue and yellow and red on a ribbon and stretching for hundreds of miles is seen nowhere else in the world, the nearest approach to it being, I have heard, in the cliffs that stand along the middle course of the Amur River, in northeastern Asia.

Why this deep hole in the ground should inspire more wonder and awe than the loftiest snow mountain or the grandest waterfall I will not attempt to explain. But it does.

One cannot leave off gazing and wondering. Beauty and grandeur enhance one another. Morning, noon, and evening the same unchanging precipices show their unchanging colors, cliffs looking across at cliffs as they have done for millions of years and will do for millions more.

One descends by a very steep and winding footpath down to the river at the bottom and ascends again, seeing all there is to see, but the spell is the same when one emerges.

The vastness and the changelessness create a sense of solemn silence. This intense silence is the most awesome thing. Why does this strange panorama produce so profound an effect? Is it because color impressions are usually the most changeful of all the impressions we receive, since color varies with atmospheric conditions, exciting rather than stilling perception and mental reactions, that the eternal steadfastness and mathematical rigidity of these colors grasp and fix and seem to hypnotize the beholder? I do not know. Anyhow, the effect is what I have tried to describe. I am giving the experience of others as well as my own.

SCENERY OF NORTH AMERICA AND OF EUROPE COMPARED

Comparing the scenery of North America with that of Europe, the first and obvious contrast is that of scale. Everything is large, and the most interesting pieces of scenery lie far apart, with great, dull spaces interposed, for between Buffalo and Chicago, between Pittsburgh and Denver, there is not much natural beauty to admire.

Europe is small, and becomes still smaller when we remember that the northern and eastern two-thirds of it, all the region from the Straits of Dover to Asia at the Ural Mountains, and from the Baltic at Riga to the Black Sea at Odessa, have no scenic value. The beauties of Europe, if we except the coasts of the British Isles and of Norway, are nearly all in the Mediterranean countries and along the northern slopes of the Alps.

Within these limits there is beauty everywhere, perhaps most abundant and most perfect in Italy. Few, if any, regions in North America bring the stern beauties and the soft beauties together,

Photograph by George R. King

SHEARING TIME IN SOUTHERN UTAH

The wool-growing industry is of great importance in Utah, and cattle as well as sheep are raised successfully on many of the plains of the State, where agriculture without irrigation is impossible.

as, for instance, in the Italian valleys of the Alps or in Corsica or at Berchtesgaden.

Neither is there in North America any view of snow mountains so exquisite, in the combination of beauty and variety of mountain form, as that from the heights above the city of Sion, on the northern side of Valais in Switzerland, where the giants of the Pennine chain rise all the way from Monte Leone, on the east, to Mont Blanc, girt by his aiguilles, in the west, with the Dom and Monte Rosa, Lyskamm and Weisshorn, Rothhorn, Matterhorn, Dent Blanche, and Grand Combin standing in a glittering row behind the valley of the Rhone.

Still less is there anything so tremendous as the great views in the Himalaya, such as that from Sindeli La, on the border of Sikkim and Nepal, where the eye, ranging over hundreds of miles, discovers forty summits exceeding 20,000 feet in height, including the highest peak on the earth's surface.*

AN UNSURPASSED VIEW FROM PUGET SOUND

But, on the other hand, neither Europe nor Asia nor South America has a prospect in which sea and woods and snow mountains are so united in a landscape as in the view from Puget Sound of the great peaks that rise like white towers above the dark green forests of the Cascade Range, nor any valley gorges wilder than those of the Rockies, more beautiful than those of the Sierra Nevada.

In richness of colors, whether we think of the autumn woods of Maine or the rocks of the Western Canyons, America is preëminent.

Comparisons have their interest, but they are tiresome and profitless when they attempt to place above or beneath one another things essentially different. If I were to prolong this article by comparing the famous cities the same conclusion would we reach. The charm of Constantinople or Bombay is not that of Peking or San Francisco.

DOES AMERICAN SCENERY HAVE ROMANTIC APPEAL?

One word, however, I will add on a comparison sometimes made between European and American scenery which raises an interesting point for discussion. Some travelers say that American scenery is not romantic.

This sets one asking: What does the epithet mean? Is the romantic element in natural beauty something in the landscape itself, a particular charm of line or color which thrills us with emotion and stimulates imagination? Or does it depend on some association with human life, such as incidents in history or references in poetry, which bring Nature into relation with man and bathe rocks and woods and river banks in an atmosphere of human feeling?

If the latter view, which seems to be the common view, be correct, it would follow that romance cannot be looked for in regions where nothing ever happened, nothing—that is to say, of which civilized men have knowledge or over which no poet ever waved his magic wand.

New countries, such as western America and Siberia and Australia, cannot, therefore, have anything romantic in their landscapes till the landscapes have been associated with moving incidents, either real or imagined, by the poet's mind.

But is it clear that the latter view is correct? Are there not regions, such as parts of western America, where the human associations, historic and literary, are absent, but in which particular pieces of scenery affect our emotions and imagination in a way practically indistinguishable from that which European scenery is deemed to do?

If this be so, the distinction drawn between the two continents disappears or becomes a mere question of words. The influence of scenery on emotion is, however, a large subject, too large to be entered on here, and I leave it, content to have suggested a question fit to be considered at leisure.

* Out of the different native names which this supreme summit bears, it would seem that Chomo Kankar (the Lord of Snows) has the best claim to be adopted. It is usually called in English Mount Everest, a name given in honor of a former head of the Indian Survey, and British climbers are now attempting to scale it.—J. B.

MODERN SCENES IN THE CRADLE OF CIVILIZATION

GASHING the cool highlands of Armenia and Kurdistan, the Tigris and Euphrates flow out upon the ancient plain where the civilization that matters most to the Western World was born. Within the sweep of their changing river beds they inclose a land whose capitals at Nineveh and Babylon were once the wonder of the world.

Near the traditional site of the Garden of Eden they unite to worm their way across a blistering plain on their way to the hot Persian Gulf, or in flood-time spread across the land a sea in which their channel is obscured.

Beneath the dust of ages lie the former city sites, a primeval plain encrusted with history.

Here patient scholars, using countless spades in operations for which a scalpel might well prove too crude a tool, have won back the treasures of the past and made them speak to us. And young Rawlinson, on his way to train the troops of Persia's Shah, transcribed the inscriptions of the Behistun rock, facilitated the decipherment of cuneiform writing, and so shoved back the horizon of world history by many hundred years.

Here Britain's soldiers and administrators are trying to prepare this ancient highway for the bustling future and a gifted Prince of Mecca is trying to bring prosperity to the reborn Kingdom of Irak.

Here modern boatmen whirl in kufas such as men used at the dawn of time and Kurdish porters introduce into the racial complex of Bagdad such faces as one sees portrayed on old Assyrian tablets antedating Abraham.

Tommy Atkins playing Haroun-al-Raschid in the tortuous lanes of old Bagdad, across which New Street cuts its unromantic way, and wireless men using the traditional Tower of Babel as an aërial listening post seem novel because we still are hypnotized by the glamor of the past.

The veil of centuries has added mystery to a dull and dreary land, just as the Moslem veil has made each shadowy form, whose flowing vestments brush us as we pass, a figure full of interest.

The accompanying illustrations (Plates I to XVI), from photographs by Eric Keast Burke, who served with the Australian Expeditionary forces in the Near East during the World War, show that there is still color in this ancient land, bright, vivid flashes of it, dotting a vast, sun-baked palette.

MESOPOTAMIA IS A TWILIGHT LAND

Mesopotamia is a twilight land, never entirely awake and never wholly still. The summer roofs, deserted to the sun by day, become alive beneath the velvet dome of night, and the drama of the East gains mystery from the dim obscurity of its setting. Skies so clear that they made astronomers of the Chaldeans look down upon these roofless upper rooms, whose ceiling is the changing stars and the luminous Milky Way.

Persia has lent her lustrous tiles and soft carpets from Shiraz and Hamadan. Turkey's tarbouche adds its carmine glow to the open-air cafés. The stately Arab, in head shawl and camel-hair crown, sweeps through the streets with dignity which few can match.

Copper and brass glint from door-knocker and fruit-tray piled high with lusciousness. The tinkling armlets of the women faintly echo to the clink of ice in the huge carafes of the sherbet venders.

The hammering of huge caldrons from soft copper adds its own noisy note to the chorus. The sharp rap of markers on the backgammon boards hints idleness on the part of some desert son ensnared by city charms. From overhanging balconies the lattices drip sound muffled by silks and deep-piled rugs.

In the Occident such colors, sounds, and smells would reach high heaven by the virtue of barbaric strength; here they seem a natural attribute of the land of the Caliphs.

To see Mesopotamia clearly is to tear aside the curtain of romance which exaggerates her charms. Viewed in a dispassionate light and by Western standards, she cannot be thought beautiful; but when one lets the ancient spirit of the land unfold its spell, the past is eloquent and in the moonlight of imagination rude mud huts become towering, dimly lighted palaces of the shadowy past.

Mesopotamia can be cold. The salubrious winters of the Nile never become so chill. But summer beats down with

Photograph by Eric Keast Burke

BURDEN BEARERS OF MESOPOTAMIA

In the land of the Garden of Eden, human labor is so cheap and plentiful that machinery cannot compete and therefore most burdens are carried on men's backs. These coolies from the Kurdish foothills are identified by their headdress, a felt cap with a turban, and each carries around his neck the tool of his trade, a plaited strap of great strength, with which he secures his load—an upright piano, a great packing case or whatnot. Their profession is relatively well paid and after a few years' work in the city, the villager returns home with a competency.

Photograph by Eric Keast Burke

THE IRIDESCENT GATEWAY OF A MOSQUE IN BAGDAD

Richly colored tiles arranged in geometrical designs distinguish the mosques in the city of Haroun Al Raschid. Because the Moslems are forbidden by their religion to represent living things in art their development of ornamental designs is worthy of note. Over the door of this mosque, between the stars and crescents, is an adaptation of a Turkish sultan's signature in Arabic which has been utilized with considerable decorative effect. The multihued robes of the loiterers before the entrance remind one of similar scenes at Bokhara and Samarkand.

Photograph by Eric Keast Burke

RIVER CRAFT OF MESOPOTAMIA

On the waters of the Tigris and the Euphrates, the rivers which enclose Mesopotamia and give it its name, ply the curious kufas, circular boats which are large enough to carry a dozen men or half as many horses. These boats are of basketwork covered with bitumen, or mineral pitch, such as was used for mortar in the building of the walls of Babylon. Being rudderless, they whirl and bump here and there as they transport native cargoes on these historic streams.

Photograph by Eric Keast Burke

"MI-LORD, THE CARRIAGE WAITS"

This gaily caparisoned but sleepy-looking steed does not appear to require two grooms, but there is no paucity of human help for an easy job in the languorous East. The heavily padded Arab saddle, shaped like a half-hogshead, while exceedingly picturesque, is a model of discomfort with its short stirrups. To sit astride one at a gallop is to appreciate the joys of walking.

Photograph by Eric Keast Burke

CLUB LIFE IN MESOPOTAMIA

The outdoor coffee-house is the club of every town. Here the men exchange opinions on politics and trade. The head scarf, with its camel's-hair rope to hold it in place, is a conspicuous feature of Arab costume, and the native will wear American shoes long before he will adopt the Britisher's pith helmet. The protection from the scorching sun afforded by the scarf to the back of the neck makes it a safe headdress for the European in tropical countries.

Photograph by Eric Keast Burke

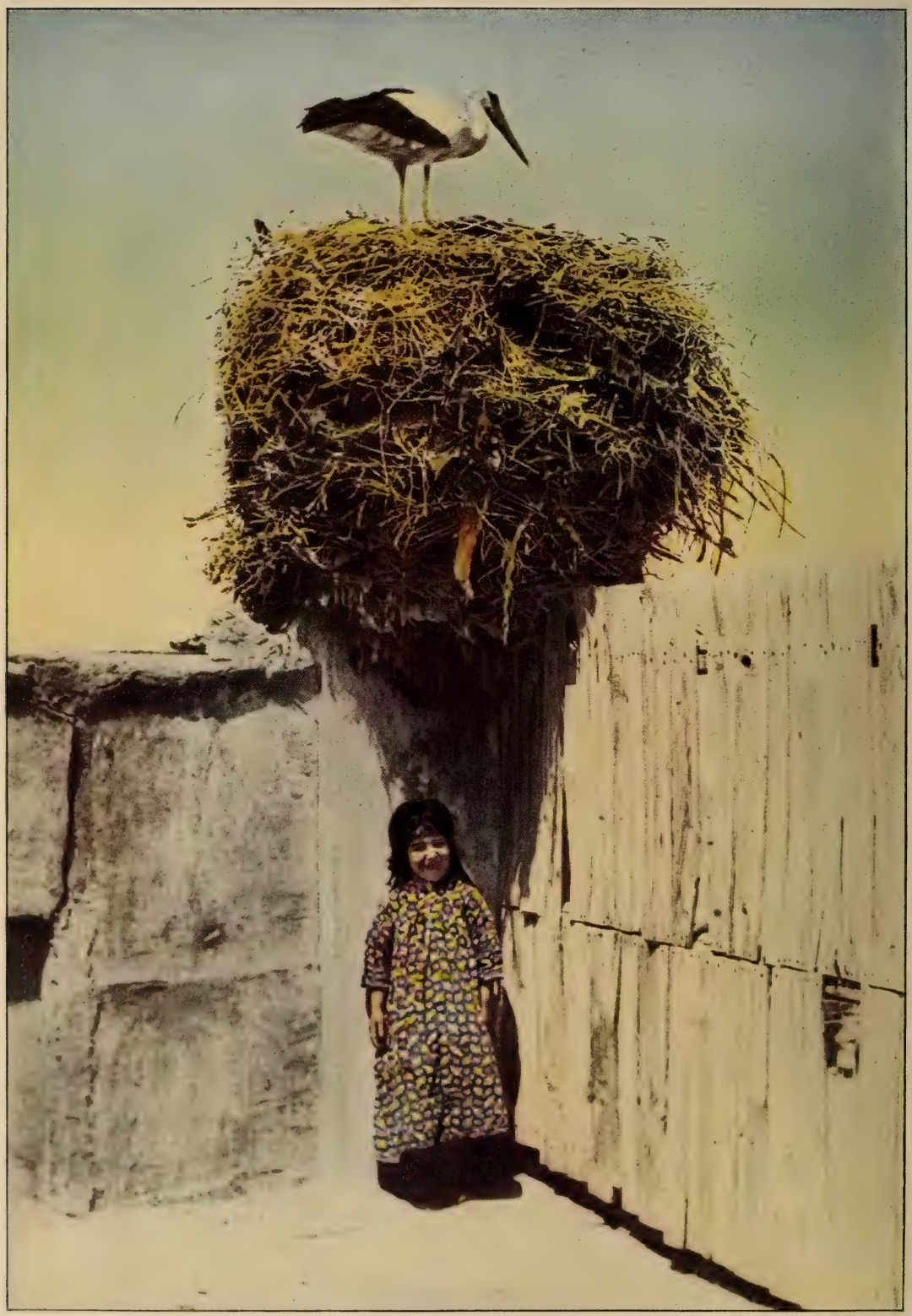
"POLISHING THE HANDLE ON THE BIG FRONT DOOR"

Door knockers are popular in the larger centers of population in Mesopotamia and are made in large quantities by the brass founders in the bazaars. The brass commonly used throughout the East is of a golden hue, but recently white brass, made by increasing the zinc content of the alloy, is becoming common. Bronze was more often used in olden times, but was called brass.

Photograph by Eric Keast Burke

JONAH'S TOMB UPON THE SITE OF ANCIENT NINEVEH

Because the Mohammedans consider this mound a holy place, no excavations have been permitted. Some explorers, however, have obtained a few relics by digging in the cellar rooms. It is interesting to observe how many Christian notables, such as Daniel, Ezekiel and Abraham, are also revered by the Mohammedans. There is a mosque to Jesus, son of Mary, in Damascus to this day.



Photograph by Eric Keast Burke

A FRIENDLY STORK AND HIS GIFT TO A MESOPOTAMIAN FAMILY

Storks are regarded with as much favor in the East as in parts of northern Europe, and their enormous nests are a familiar feature of the landscape, particularly in the villages of the Kurdish foothills. Good luck is supposed to visit the house chosen by the stork as a nesting place. In Turkestan, the storks nest on the domes of mosques as well as on the roofs of dwellings.

Photograph by Eric Keast Burke

THE CAMEL'S COMPETITOR

These patient little burden bearers are usually overloaded because the owner puts on the load and then clambers on himself. The favorite amusement of some of the British soldiers during the World War was to make each driver dismount and give his beast a rest as he passed their camp. Neither bit nor bridle being used, change of direction is achieved by striking the animal on the side of the head opposite to which it is desired to proceed. The question naturally arises, "Why shouldn't the sheep carry himself?"

Photograph by Eric Keast Burke

A MOSLEM MENDER OF CHRISTIAN SOLES

The favorite footgear of the Bagdadians is the yamanis, a red or yellow slipper without a heel, and while a more modern style has recently been set by the British in this ancient land, the native populace is slow to change. Tight shoes may be modern, but a bare foot thrust into a flappy sandal or a heelless slipper is likely to be more comfortable.

Photograph by Eric Keast Burke

CIRCUS LEMONADE IN BAGDAD

The glasses and copper vessels contain drinks of gaudy colors and a sweetness which makes them unpalatable to the Westerner. The proprietor is driving off the flies with a bit of palm leaf. The woman on his right is enjoying a well-earned rest after disposing of her stock of homemade flaps of bread (khubz) which she had been vending from the flat basket at her feet.

Photograph by Eric Keast Burke

THE LEANING MINARET OF THE GREAT MOSQUE OF MOSUL

An Arab legend relates that the tower bowed its head in reverence to Mohammed when once he passed that way, and was unable completely to recover its equilibrium.

Photograph by Eric Keast Burke

A YOUNG PERSIAN PILGRIM AT KAZIMAIN

The resplendent tiled facades of the tomb-mosques of Kazimain and those at Samarra and Kerbela Nejef attract pious pilgrims of the Shia sect to which many Persians belong.

Photograph by Eric Keast Burke

A CUISINE "A LA MESPOT"

In this cookshop of the bazaar the chef is roasting little squares of meat called kibobs on spits over the red embers of a charcoal fire which his assistant keeps aglow with a fan. When they are done to a turn he will wrap them in a flap of bread (khubz) from the copper tray at the right and serve them to a customer. Fresh kibobs have a rare appeal, and when the customer has completed his meal he counts the spits and pays accordingly.

Photograph by Eric Keast Burke

A CARPENTER AND DECORATOR BESIDE THE EUPHRATES

This chest when it is gaily decorated will probably form the "hope chest" or "glory box" of an Arab lady. Wood is scarce in many parts of the East, hence is highly valued. Much labor is expended in decorating it and inlays of alternate silver and mother-of-pearl are frequently seen. The painted tray is of copper and has been decorated to order by some gentleman who has a banquet in view. In other parts of the Near East, damascened brass trays inlaid with silver and copper figures are common.

Photograph by Eric Keast Burke

A PERSIAN IN BAGDAD

He is one of an interesting element in the Mesopotamian population. In Bagdad, Persians earn a livelihood by trade and as carriers to their own country. From earliest times, when this city was the crossroads of the East, these people have been familiar sights on the streets. They are easily identified by the peculiar hat, like a brimless derby, for the Arab wears a head scarf and the Jews and Armenians wear the tarbush or fez. (See color plates V and VI.)

a violence that makes one realize that only by the sweat of many brows was civilization nurtured here, amid natural forces against which modern man must needs renew the fight if the land is once more to blossom as the rose, with crops three-hundred-fold, such as Herodotus described.

MARSHES MAY BE REDEEMED

Far to the north lies the plateau which stretches from the Taurus to Mount Ararat, bitter cold in winter, though with a clear sky which makes the noon delightful, even beside the ruined homes of Van. In spring, warm rains descend, the summer rushes north, and heavy snows which block the mountain roads melt quickly on the slopes, from many of which the forests have long since disappeared.

Through the rounding country of Assyria and the Hittite lands the Tigris and Euphrates flow, confined by cliffs and hills to comparatively narrow valleys; but at the fall-line which marked the boundary as well as the difference in geographic character between Assyria and Babylonia, the piled-up waters tend to spread across a wide alluvial plain.

Once the floods were laboriously tamed and turned aside to reservoirs and there impounded against a later need; but even then the lower plain was so submerged that dikes were built to save the towns and fields from devastating waters. Now the old canals are clogged with silt and useless marshes occupy the fields where a hungry world might win back a spreading granary.

Slowly the rivers are carrying down their delta to the sea and pushing back its tides; but man has not kept pace with this slow growth nor claimed the land thus made. Optimists see the day when the twin rivers, once more tamed, will bring prosperity through irrigation and drainage directed by Western engineers.

Wrestling with the raging waters and tried by the heat and cold of a savage climate, the Babylonians not only became strong, but came to understand the irrigation problems higher up the rivers, and thus sought to extend their sway over the region where the water supply could be stored up.

The rivers offered life and peace in return for toil, and man gradually conquered natural forces until great cities rose above the wide clay plain and muddy floods. Sumer, Akkad, Babylonia, Assyria grew through toil and held their position through constant vigilance on the part of their people; but the day came when man, at war with other men, withdrew his supervision. Silt and flood came down to drown the city states and hide their corpses under shapeless mounds.

When one enters the Shat-el-Arab and passes through the swamps that lie below Abadan, he realizes that here the combined Tigris and Euphrates have spewed forth their load of silt throughout the centuries until the shore-line of the Persian Gulf has retreated for a hundred miles.

Ocean liners run up to Basra, a modern, bustling port on the Shat-el-Arab. Here one is shown the house of Sinbad the Sailor, for traditions live longer than human beings in such a feverish land, and the visitor can picture a scene which has not changed since the Caliphs ruled; but as one listens to a camel roaring a useless protest in the bazaars, the deep whistle of a modern steamship booms forth to remind one that the twentieth century cannot wait for dreams.

A LAND OF COLOR AND DREAMS

Bagdad, with its melons and kufas, desert Arabs and veiled women, whose veils are becoming distressingly thin, deserves a story of its own.

Here and there in old Bagdad itself we have seen tiled doorways and domes that hint of loveliness which is not wholly gone; but when the twilight comes and one looks west above the flat mud roofs of the city, one sees, across the Tigris, the golden domes and minarets which rise above the mosque of Kazemain.

Upon those domes, outlined as black as night against the sunset sky, one marks the crescent, which lies like a kiss from heaven on their matchless curve; and then one realizes why this ancient land is still Irak and why an Arab noble, wearing desert garb, there rules as king. Mesopotamia, rescued though it be by engineering skill which shall reclaim the marshes and supplant the creaking water-hoists, will still remain the East, the land of color and of dreams.

Photograph by Donald Furguson

WEDDELL GLACIER ENTERING ROYAL BAY: ISLAND OF SOUTH GEORGIA

This majestic river of ice was named for the Englishman, James Weddell, who visited South Georgia one hundred years ago. It was on the shores of this bay that the staff of the German *Transit of Venus Expedition* of 1882-83 spent a year, adding much to the world's knowledge of the natural history of this outpost of the Antarctic (see text, page 417).

SOUTH GEORGIA, AN OUTPOST OF THE ANTARCTIC

By Robert Cushman Murphy

American Museum of Natural History

With Illustrations from Photographs by the Author

ON JANUARY 4, 1922, the little *Quest,* one of the most romantic of the many vessels which have sought to pry into the cold secrets of the South, lay in the sheltered basin of Grytviken (King Edward Cove), Cumberland Bay, South Georgia, an island outpost of the Antarctic lying more than 1,000 miles east of Cape Horn. Repairs had been completed, following the battering of a stormy passage from England by way of Lisbon and Rio de Janeiro, and she was awaiting the signal to purchase her anchor.

The commander, cheerful and active as usual, had been ashore at the whaling station, arranging final details for the morrow's departure into the fogs and summer ice-flows of Weddell Sea.

But for him that morrow was never to dawn; before daybreak of January 5 the responsibility of leadership had fallen upon other shoulders. With the faith and determination which characterize both seafarers and men of science, the members of the British Antarctic Research Expedition were making their plans to carry on without the inspiration of the commander's presence.

A great-hearted Irishman, a hero of three earlier polar voyages, a leader who had repeatedly shown his readiness to lay down his life for his friends—Sir Ernest Shackleton—was dead in the cabin of his tiny craft, at the very beginning of investigations which would have furnished a worthy capstone for his career.

SHACKLETON'S THRILLING TRIP TO SOUTH GEORGIA FOR HELP

Strangely enough, the distant isle at which Shackleton came to an untimely end had already been associated with important incidents of his life as an explorer. In 1914 he made South Georgia the first southern base of the *Endurance,* and it was here that he took aboard his final stores before going southward in December into Weddell Sea.

Here, too, the members of the expedition waited anxiously but vainly for tidings of the war, which had broken out just before the *Endurance* left England under orders from the Admiralty to "proceed" in spite of the impending conflict. Barely two hours after the polar ship had departed from Cumberland Bay, the steamer *Harpon* arrived from Buenos Aires with news and mail—too late.

Shackleton's even more dramatic association with this ice-bound island came, however, in May, 1916, when, after the loss of the *Endurance,* he made a marvelous two weeks' journey in an open boat from Elephant Island, of the South Shetland group, to the southwestern coast of South Georgia. The leader and two companions crossed the mountains from King Haakon Bay to Stromness Bay, a terrific journey of thirty-six hours, which is vividly and stirringly described in his book "South" (see map, page 412).

THE EXPLORER MISTAKEN FOR THE MATE OF THE "DAISY"

If Sir Ernest had headed directly north and had followed a line of march which the whalers have used on their Sunday holidays for years, and which was subsequently pointed out to him on my personal sketch map of South Georgia, he would have arrived within three or four hours at the whaling station in Prince Olaf Harbor, near the mouth of Possession Bay; but at the time he was unaware of the existence of this station.

When he and his comrades finally reached the Tonsberg Company's station in Husvik Harbor, Stromness Bay, the first persons whom they met ran off as if they had seen the devil himself, and as a welcome relief to the physical and nervous strain to which the wanderers had been subjected, the following ensued:

THE "QUEST," SIR ERNEST SHACKLETON IN COMMAND, PASSING UNDER THE TOWER BRIDGE OF THE THAMES: LONDON

The noted Antarctic explorer sailed from London in September, 1921, on an expedition to the South Polar regions which was to have extended over a period of several years.

We came to a wharf, where the man in charge stuck to his station. I asked him if Mr. Sorlle (the manager) was in the house.

"Yes," he said, as he stared at us.

"We would like to see him," said I.

"Who are you?" he asked.

"We have lost our ship and come over the island," I replied.

"You have come over the island?" he said in a tone of entire unbelief.

The man went toward the manager's house and we followed him. I learned afterwards that he said to Mr. Sorlle: "There are three funny-looking men outside, who say that they have come over the island and they know you. I have left them outside." A very necessary precaution from his point of view.

Mr. Sorlle came to the door and said, "Well?"

"Don't you know me?" I said.

"I know your voice," he replied doubtfully. "You're the mate of the *Daisy*."

"My name is Shackleton," I said.

This episode proved of particular interest to me when I first read in "South" the glorious tale of the rescue by Shackleton of the Elephant Island party, for the *Daisy*, now at the bottom of the Atlantic, was my brig.

Following hard upon word of the explorer's death, in January, came the announcement that Lady Shackleton had decided to have her husband's remains sent back from Montevideo to South Georgia for interment. What could be more appropriate than that Shackleton should lie forever at the Gateway of the Antarctic—in the green and mossy hillside between Grytviken and the talus of the granite coast range, within sight of glacier-lined fjords and the icy crest of the Allardyce Alps?

THE FIRST SOUTH POLAR LAND KNOWN TO MAN

In view of the connection, which will henceforth be perpetual, between South

GRYTVIKEN, CUMBERLAND BAY, WHERE SIR ERNEST SHACKLETON DIED

This whaling station on South Georgia is also known as King Edward Cove. Shackleton's ship, the *Quest*, which had anchored here for repairs, was ready to resume its voyage to the Antarctic when the famous leader was stricken (see text, page 409).

Georgia and a man whom all the world mourns, it is of timely interest to recount the history and to describe the geography and life conditions of the island.

This is all the more true because South Georgia is, in every sense, a very type and epitome of all the subantarctic regions. It was, moreover, the first South Polar land known to man and it was discovered during the golden age of exploration.

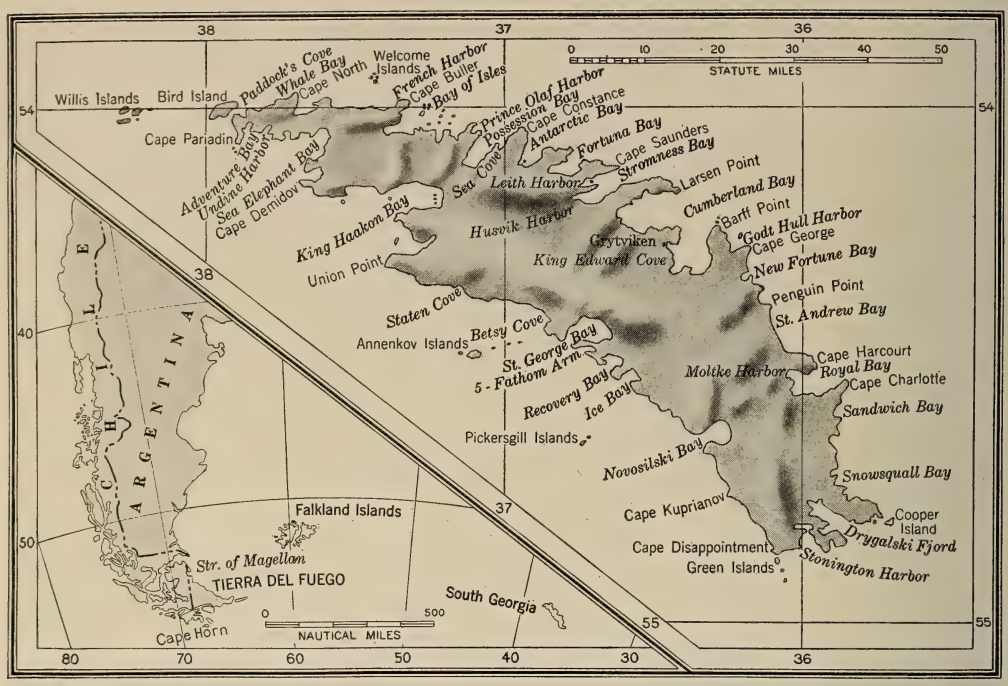
DISCOVERED BY JAMES COOK IN 1775

Until the latter part of the eighteenth century, maps of the world commonly included a conjectured landmass lying south of the known continents and labeled *Terra Australis Incognita*. From time to time since the discovery of America, vague reports of southern land had been brought to Europe by mariners who had been blown southward out of their course, and contemporary geographers had held persistent hopes for the discovery and exploitation of an austral continent which might add a second New World to the globe.

During the week beginning Sunday, January 15, 1775, James Cook, commander of H. M. S. *Resolution* on a voyage in search of this *Terra Incognita*, was cruising along the coast of an ice-covered island in latitude 54° 30′ south. The isle had appeared unexpectedly in the path of the *Resolution*, and it was the first assurance of the disappointment in store for mankind.

The discoverer was somewhat depressed on seeing the barrenness of the new land, whose rocky shore and cliffs of ice were but gloomy auguries for a habitable territory lying still nearer the Southern Pole.

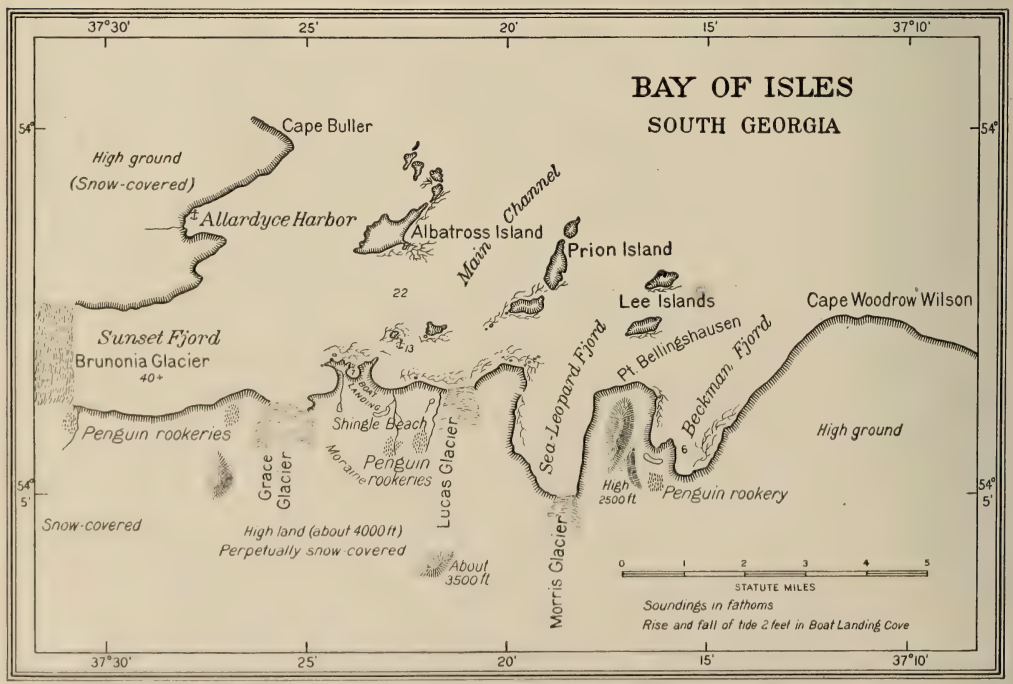
"The wild rocks," Cook entered in his journal, "raised their lofty summits till they were lost in the clouds, and the valleys lay covered with everlasting snow. . . . The very sides and craggy summits of the mountains were cased with snow and ice, . . . and at the bottom of the bays the coast was terminated by a wall of ice of considerable height. . . .



Nomenclature according to R. C. Murphy

THE ISLAND OF SOUTH GEORGIA, OUTPOST OF THE ANTARCTIC

It lies in the South Atlantic, more than 1,000 miles east of Cape Horn and 2,500 miles southwest of the Cape of Good Hope.



THE AUTHOR'S SKETCH MAP OF THE BLEAK AND LONELY BAY OF ISLES

The coast of this wild South Georgia inlet consists of rocky glacial beaches separated by promontories, and with magnificent glaciers between (see text, page 419).

THE BRIG "DAISY" IN THE ANCHORAGE OF THE "QUEST"

This was the staunch little vessel in which the author made his voyage to South Georgia (see text, page 418). Mt. Paget, in the background, rises to a height of 8,383 feet.

Not a tree was to be seen, nor a shrub even big enough to make a toothpick. The only vegetation . . . was a coarse strong-bladed grass growing in tufts, wild burnet, and a plant like moss which sprung from the rocks."

Referring to his blighted hope of a fair Antarctic land, he added: "To judge of the bulk by the sample, it would not be worth the discovery. . . . Who would have thought that an island of no greater extent than this, situated between the latitude of 54° and 55°, should, in the very height of summer, be in a manner wholly covered, many fathoms deep, with frozen snow?"

Cook took possession of the country for England and named it the Isle of Georgia; and, after charting the coast, he proceeded on his famous circumnavigation of the world.

"SEA-BEARS" ADDED TO POPULARITY OF SOUTH GEORGIA TALES

Captain Cook's observations on the Isle of Georgia were characteristically thorough. He recorded the depths of some of the inlets and the extent of the tidal rise. He referred to the abundance of seals or "sea-bears," sea-elephants, and penguins. He noted the albatrosses, gulls, "Port Egmont hens," terns, shags, divers, and "blue peterels," which circled over the seas, and the small titlarks of the land. He mentioned that the rocks seemed to be rich in iron. But, most of all, he was impressed with the worthlessness of his landfall and the futility of his search.

South Georgia, as the island came to be called, was destined not to be forgotten, for the brave tales of Captain Cook were popular reading during the early years of American independence. It may be that his word "sea-bears" was the lure that started the first follower in the wake of the *Resolution*. Certain it is that before the close of the eighteenth century bold Yankee mariners from New London, Stonington, and other Long Island Sound ports had begun to reap the harvest of fur-seal skins at South Georgia.

In the season of 1800-1801 the crews of the fleet killed not less than 112,000 fur-seals. For 20 years the slaughter

THE ALLARDYCE ALPS, FROM CUMBERLAND BAY

The building on the spit in the foreground is the Argentine Meteorological Observatory.

GRACE GLACIER: BAY OF ISLES

The main body of this glacier, whose impassable surface is composed of dazzling pinnacles, in some seasons extends far out into deep water.

THE "DAISY" AT ANCHOR IN THE BAY OF ISLES

THE AUTHOR'S CAMP AT THE BAY OF ISLES: SOUTH GEORGIA

The grassy islets from which the bay derives its name furnish nesting places for myriads of ocean birds, chief of which are the wandering albatrosses.

continued, and then there were no fur-seals left. A respite of several decades gave the unfortunate animals a chance partly to replete their numbers, when the extermination was resumed and carried to completion. In 1874-1875 about 200 skins were taken, and a few more in 1892. Between 300 and 400 fur-seals were slain illegally in 1907, since when scarcely an animal of the species has been reported from South Georgia.

When the supply of lucrative fur-seals first began to fail, the other amphibious monsters mentioned by Cook, the sea-elephants, were forced to pay the costs of the ruthless voyagers. The sea-ele-

A SEA-ELEPHANT GOING DOWN A BANK

These creatures, despite their ungainly movements on land, are able to bob along on a level surface faster than a man can walk.

phant is the largest of seals, and is thickly invested with blubber which yields an oil little inferior to the product of the sperm whale; hence, "elephant hunting" became an important industry at most of the sub-Antarctic islands. In many of its haunts the species was soon exterminated, and, although at South Georgia it still persists, its days are numbered unless absolute protection be soon enforced.

THE WORLD'S GREATEST WHALE FISHERY

But the tale of human industry at the barren isle is not yet told, and the latest development already overshadows a century of sealing. Eighteen years ago Norwegian seafarers, Vikings still, found a field unspoiled by the bloody dynasty of their American predecessors, and they have made South Georgia the headquarters of the greatest whale fishery on earth.

Between 1910 and 1920 more than forty thousand whales, representing a value of roughly fifty millions of dollars, have been shot on the offshore banks and towed to the bustling whaling stations of the island. In a single year (season of 1915-1916) the South Georgian catch numbered 5,510 whales.

During the earlier years of whaling, the humpback was the mainstay of the industry, constituting more than 96 per cent of the catch; the finback whale next rose to importance as the humpbacks declined; and, finally, the blue whale has become the principal "fish."

This sequence corresponds with the order of size of the three species, the humpbacks being 50 feet in length or less, the finbacks reaching 85 feet, and the blue whales approaching, and sometimes exceeding, 100 feet. In 1917-18 the proportionate numbers of the three species taken was as follows: humpback, 2.5 per cent; finback, 29.3 per cent; blue whale, 68.2 per cent.*

WHALES FURNISHED OIL FOR WORLD WAR EXPLOSIVES

Soon after the outbreak of the World War the British Minister of Munitions appointed an official to take charge of

* Report of the Interdepartmental Committee on Research and Development in the Dependencies of the Falkland Islands, 1920, p. 8.

matters pertaining to the production and utilization of all oils containing glycerin. Attention was then drawn to the fact that the oils of whalebone whales, particularly the humpback and fin whales, are so rich in glycerin that the substance could be profitably extracted for use in the manufacture of explosives.

At the same time it became apparent that the British Government controlled, by right of territorial possession, practically the whole of the shore whale fishery in the Far South, including the catch of stations at South Georgia, a number of the other subantarctic islands, the Falklands, and the coast of the Antarctic Continent west of Weddell Sea.

Many of these whaling stations were operated by Scandinavian or Argentine capital, but by enforcing its undeniable right of making the whaling licenses contingent upon the sale of the oil in British markets, the government succeeded during the war in obtaining something like fifty million gallons of this oil, all of which had a high glycerin content.

A SNAPPING FEMALE OF THE SPECIES

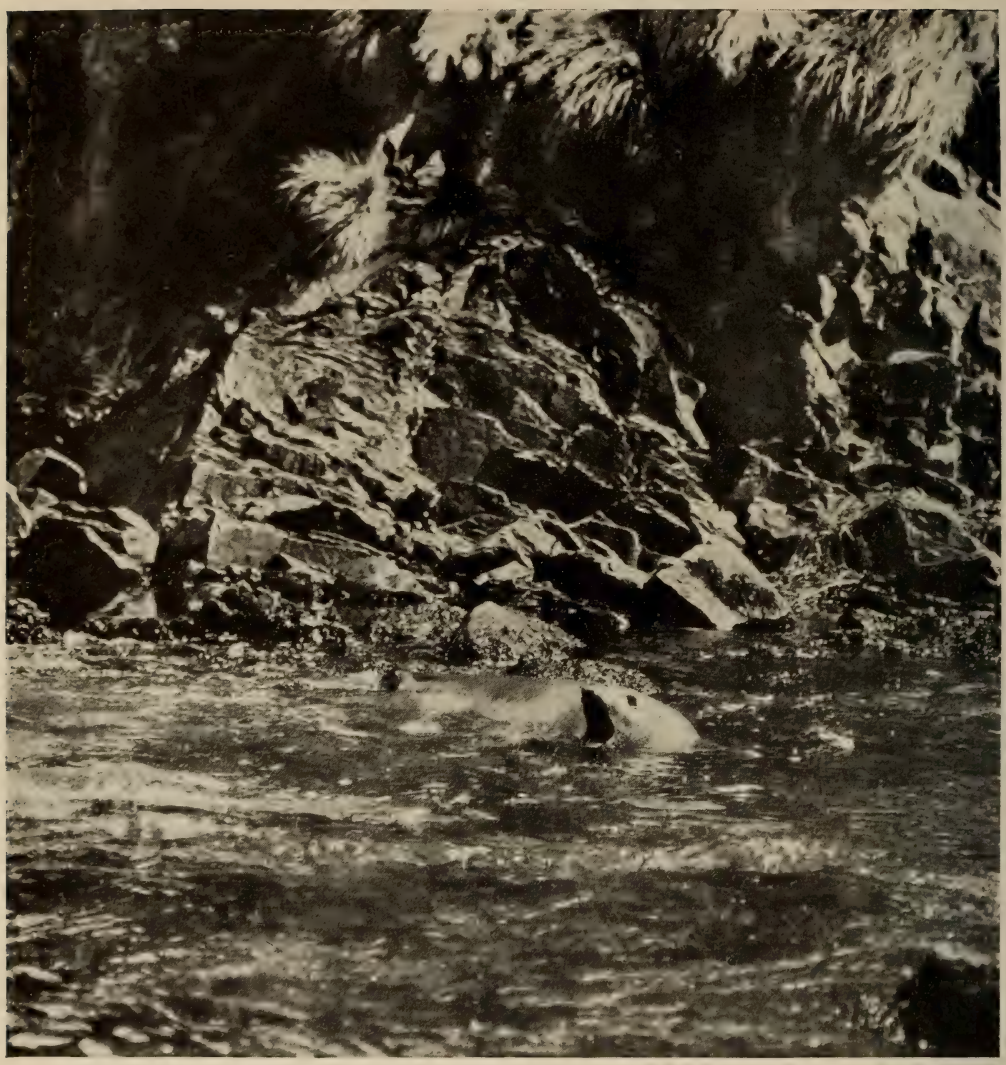
The sea-elephant cows weigh from 600 to 700 pounds and seldom attain a length exceeding nine feet, while the males measure from 18 to 21 feet.

These facts are a sufficient commentary upon the value to a modern nation of out-of-the-way, seemingly worthless land holdings, such as isolated, arid, or ice-covered islands. Great Britain alone, among the great powers, has had the foresight, whether conscious or not, of making good her dominion while there was none to gainsay her.

So much for an epitome of commercial exploitation at a land which one of Captain Cook's associates described as "of less value than the smallest farm in England."

SCIENTIFIC INVESTIGATION ON SOUTH GEORGIA

The history of scientific investigation at South Georgia may be more briefly retold. Following Cook, the Russian explorer Bellingshausen in 1820, the Englishman James Weddell in 1823, and the members of several recent Antarctic expeditions have done much to increase our knowledge of the island; but it is especially to the German *Transit of Venus Expedition* of 1882-1883, the staff of which spent a year at Royal Bay, that



A YOUNG SEA-ELEPHANT TAKING TO THE WATER

science is indebted for its most important information in the various domains of natural history.

Notwithstanding the researches of the scientific expeditions referred to, and of several individual workers, there remain many fields awaiting study at this subantarctic isle. Like most of the other austral islands, South Georgia has not yet been correctly charted. The altitudes of its mountains are still unknown; only two species of fossils have thus far been unearthed from its hills; we have merely fragmentary records of the life histories of most of its vertebrated animals; the scope of its botany, particularly the cryptogamic botany, has certainly not been exhausted, and the teeming marine life, both plant and animal, is practically a volume with uncut leaves.

My trip to South Georgia was made in the manner of the pioneers, for I was away a full year on the old New Bedford whaling brig *Daisy*, B. D. Cleveland, master. We "made the land" at the middle of the northwest coast late one November, and next day we were towed by a whaling steamer into Cumberland Bay, where the *Daisy* lay at anchor until mid December.

During this visit I enjoyed the unfailing hospitality of the Norwegian ex-

plorer, Capt. C. A. Larsen, founder of the whaling station of the *Compañia Argentina de Pesca*, in King Edward Cove. To the resident British magistrate also, Mr. J. Innes Wilson, whose snug hermitage lay beneath the pyramidal "Dusefell," on the banks of the cove, I am indebted for many courtesies and for liberal assistance in my work. This gentleman exerted every effort to conserve the wild life of South Georgia, and particularly to prevent the fur-seal tragedy from being duplicated by the extinction of the sea-elephants.

A "PUP" SEA-ELEPHANT TWO OR THREE WEEKS OLD

During November the herds, comprising animals of all ages, spend most of their time sleeping in the tussock grass. Most of them go to sea by the middle of December.

IN THE BAY OF ISLES

From Cumberland Bay the *Daisy* sailed westward to the bleak and lonely Bay of Isles, a hitherto-uncharted cluster of fjords, which were important havens in the old days of the seal fishery. The coast of this wild inlet consists of rocky glacial beaches separated by promontories, which rise in several places to an altitude of about 3,000 feet, and the valleys opening on the beaches are filled with magnificent glaciers, flowing from far inland into the sea (see map, page 412).

A moraine beach between two of the glaciers is famous in the unwritten history of Connecticut sealers as a popular "hauling-up" place for sea-elephants. The grassy islets, from which the bay derives its name, furnish nesting sites for myriads of ocean birds.

Just east of the Bay of Isles is Prince Olaf Harbor, where we found several lonely graves on a tussocky knoll by the sea and a rude, corroded metal sheet, which commemorated the mate and several sailors of the *Sarah Jane*, of New York, who perished so far from home in 1838.

GLACIERS AS MIGHTY AS THOSE OF SPITZBERGEN

The geologic structure of the high and rugged mountains of South Georgia indicates a former connection with the Andean system through a bridge of land now sunk a thousand fathoms beneath the sea.

Small though South Georgia is, its glaciers are as mighty as those of Spitzbergen, and there is ample evidence that the

"DEAD TO THE WORLD"

The chief business in the life of the sea-elephant is sleeping. The animal usually lies on its back, with the nostrils tightly closed most of the time. There is no danger of its sleep being mistaken for death, however, for its flippers are moving nervously, now scratching its sides, now its head, and from time to time scooping up mud or sand, which is scattered over the body.

A SEA-ELEPHANT "COW" AND HER "PUP"

The mother is scratching herself, while her offspring gaily waves its hind flippers and the skua gull looks on.

A SEA-ELEPHANT SWINGING COMPLETELY AROUND AFTER BEING AROUSED FROM SLEEP

The animal has faced the sailor who stepped on his hind flippers.

island was formerly completely buried by an ice-cap. The high ground of the interior is covered with an everlasting névé, which consolidates at the sources of all the valleys to form tongues of ice, most of which extend clear into the sea, ending in abrupt walls.

The one incomprehensible statement in Captain Cook's account of South Georgia is his emphatic testimony that he saw no brook or stream along the whole coast. Certainly in our time the rushing torrents are a great impediment to progress on land, and during January thaws gleaming cascades, visible from far at sea, pour from the ledges of the coast hills.

IT RAINS OR SNOWS FIVE DAYS OUT OF EVERY SIX

The climate of South Georgia varies relatively little throughout the year. The mean annual temperature is very close to the freezing point, and the sky is prevailingly overclouded. February is the warmest month. Snow, generally in the form of hard, globular particles, which sting the skin like hail, falls in every month, and rain and sleet storms are both frequent and prolonged during the summer. Either rain or snow falls on about five-sixths of the days of the whole year.

The greatest proportion of clear days is in winter; but November and December, the springtime of the southern world, are often made memorable by a few successive days of sunshine, while on rare midsummer afternoons of January and February the jealous Ice King is sometimes lulled to sleep, the thermometer rises as high as 68° F., and South Georgia basks in a sparkling calm. Only on such fleeting occasions is the subtle feeling of the glaciers absent from the land and sea.

There was but one hard frost at sea-level during the summer of my visit, this being at the Bay of Isles on the night of January 13, when a half inch of ice formed on all the fresh-water ponds.

VIOLENT GALES ARISE UNEXPECTEDLY AND SERIOUSLY MENACE NAVIGATION

The prevailing winds are westerly and southwesterly, and since tremendous barometric changes take place very quickly at South Georgia, there is probably no

A SEA-ELEPHANT IN SHALLOW WATER

place on earth where violent gales arise more unexpectedly or blow with more terrific force. A sustained total force of 38.5 miles per hour has been recorded in April at the comparatively sheltered observatory in Cumberland Bay, while the velocity of the maximum gusts has been estimated at 140 miles.

Time and again during our visit the *Daisy's* anchors were heaved up from 15 fathoms by hours of toil, only to have a gale spring up unannounced, so that the chains could hardly be loosed quickly enough to renew the moorings.

The light, doldrum airs of South Georgia fjords are equally treacherous. I have seen the wind shift its direction 90 degrees in the course of 10 minutes, and one could never tell when a furious puff would whistle through a mountain pass and tear up watery sheets from the surface of the bay at the imminent risk of driving our helpless whale-boats into the face of a glacier or onto a rocky islet. Fortunately we came through the whole inclement season with no greater loss than the staving of two boats on the shingle of a lee beach, the crews subsequently spending 18 hours exposed to the fury of the blizzard.

The affinities of the flora are in the main with the South American continent; to a lesser extent with New Zealand and the eastern subantarctic islands. The plant life presents a transition stage between the Falkland or the north Fuegian type and that of the Antarctic mainland.

FEW PLANTS ON SOUTH GEORGIA

The most abundant and conspicuous plant is the virile tussock grass (*Poa flabellata*), which covers much of the lower ground and straggles up the hills on favorable northern exposures to a height of nearly 1,000 feet.

The individual plants of the tussock grass form high, circular pedestals or hummocks. The stalks attain a length of over four feet, and, according to Prof. Carl Skottsberg, a single hummock may flourish for a quarter of a century or more. The other grasses of South Georgia are inconspicuous.

The extreme paucity of this treeless, shrubless vegetation may be well realized by comparing South Georgia with regions in high northern latitudes. Labrador, at the corresponding parallel, has magnificent forests. Saltdalen, Norway, north of the Arctic Circle, boasts not only luxuriant timber land, but thriving fields of hay and barley as well; and Melville Land, in 75° north latitude, 1,400 miles nearer the Pole than South Georgia, has about 70 species of flowering plants as against the latter isle's 15.

A BULL SEA-ELEPHANT AND A NEW BEDFORD SEALER

The man is preparing to kill the animal with his lance.

The respective conditions are explained in a general way by Darwin as follows: "On the northern continent the winter is rendered excessively cold by the radiation from a large area of land into a clear sky, nor is it moderated by the warmth-bringing currents of the sea; the short summer, on the other hand, is hot. In the Southern Ocean the winter is not so excessively cold, but the summer is far less hot, for the clouded sky seldom allows the sun to warm the ocean, itself a bad absorbent of heat; and hence the mean temperature of the year, which regulates the zone of perpetually congealed undersoil, is low."

AN "OCEANIC" CLIMATE

South Georgia has an *oceanic*, as opposed to a *continental*, climate; it is under the continual equalizing influence of the sea, and it thoroughly demonstrates how much more unfavorable to the production of a varied flora is a constantly low temperature than seasonal cold of the severest kind.

As stated previously, South Georgia has been completely glaciated during some period of its history, and there is no probability that any of the higher plants have existed there from pre-Glacial times. Their introduction, by wind, drift, or birds, must have been since the last ice period, and if we allow for the addition of two species in each thousand years we have sufficient time for the natural transportation of the present phanerogams (flowering plants).

To consider a speculative example, the fruits of *Acæna adscendens* (Captain Cook's "wild burnet") are hooked, so that the seeds may have been carried great distances by ocean birds, or by seals which often sleep in growths of this plant.

Owing to the same oceanic life conditions, the land animals of South Georgia are even fewer than the plants. There is no indigenous terrestrial mammal, but rats, horses, and reindeer have been introduced and are thriving in a wild state. The rats were probably first brought by sealing vessels a hundred years ago.

TITLARK ONLY LAND BIRD PECULIAR TO ISLAND

There is a single species of land bird, a titlark (*Anthus antarcticus*), peculiar to the island. Iceland, on the threshold of

THE FULL-MOON COUNTENANCE OF A YOUNG BULL SEA-ELEPHANT

The necks and breasts of these ungainly looking beasts are covered with an armor of hide an inch thick. They are a contentious tribe, many of the older animals bearing scars extending through the blubber layers on the shoulders as reminders of mating-season battles.

the Arctic, is inhabited by more than 20 species of land birds, yet South Georgia, in the possession of its lone titlark, is richer than the Crozets or Kerguelen Land or any of the other snow-covered austral islands. Twenty-three species of breeding water birds and three species of seals complete the list of native vertebrates which spend part of their existence on land. An earthworm (*Acanthrodilus*) is common, and there are several forms of rock spiders, a mite (*Bdella*), and a tick infesting some of the birds.

The insects comprise parasitic fleas; small beetles of the genus *Hydromedion*, closely related to our "meal-worm" beetles; large sluggish flies, which breed in damp seaweed along the drift line; minute wingless flies; ephemeral May-flies, which swarm over the tussock grass after thaws; and acrobatic "springtails," or Collembola.

The springtails (*Isotoma*) swarm by inconceivable millions in the dark, loose, vegetal mold among the tussock stalks. I used to collect them by placing a saucer of alcohol on the soil, and the marvelous little skippers, leaping pell-mell hundreds of times the length of their tiny bodies, would shower down invisibly into the saucer as if they were spontaneous creations of the atmosphere.

A TEEMING MARINE LIFE

The abundance of the marine life is in marked contrast to the scanty terrestrial fauna and flora. Red, green, and brown algæ, starfishes and sea-cucumbers, jelly-fishes, shells, squids, and innumerable crustaceans thickly people the fjords.

Pelagic shrimps, upon which the whales and penguins feed, travel in dense shoals, while close along shore the giant kelp, that longest of sea plants, harbors among its 50-fathom branches an aggregation of living creatures more varied and abundant than any inhabiting forests of the upper world.

When the ocean is calm and the sun peeps through the clouds, sending a shaft of light down into the green obscurity of the bays, the water may be seen to be literally filled with minute transparent things, which constitute the so-called

A ROARING SEA-ELEPHANT

The war-cry of this animal is a curious strangled bellow. Even in his sleep he is noisy, for he continually emits gasps and tremulous wheezes, as if afflicted with nightmare.

plankton. There are no fresh-water fishes at South Georgia. The marine fishes are represented by only a few species, but these are exceedingly abundant.

MAKING THE ACQUAINTANCE OF SEA-ELEPHANTS

Within a few days after our arrival at South Georgia we made the acquaintance of the sea-elephants. The young, known to sealers as "pups," had been born about two months earlier in the year. The mating season of the adults had followed, and during November herds comprising animals of all ages lay, sleeping and fasting, in the tussock grass until they were ready to go to sea again, which most of them did by the middle of December.

The patriarchal bulls, whose unwieldy bulk and long snouts have given the species its common name, were rather scarce in the vicinity of Cumberland Bay, but hundreds of huge carcasses, stripped of blubber and rotting on the beaches, were constant tokens of their abundance in former years.

Shortly after New Year sea-elephants, rejuvenated and fattened by active sea life and a diet of fish and squid, began to return to the land, congregating in summer colonies behind the open beaches. The females came first, the large bulls mostly staying in the sea until February. During the latter part of February, 18-foot bulls came out on the beaches frequently, and on the last day of the month we killed a gigantic brute which measured, from snout to hind flippers, 21 feet 4 inches, or almost twice as much as a walrus.

Female sea-elephants are relatively small, seldom exceeding a length of 9 feet and a weight of 600 or 700 pounds. They lack altogether the long snout of the male, the face of an adult female rather resembling that of a pug dog.

SEA-ELEPHANTS ARE "BORN FIGHTERS"

Sea-elephants have contentious dispositions and are given to fighting among themselves from earliest puphood, yet fondness for company is one of their marked traits. An animal coming out of the sea is obviously not contented on a lonely shore. It wanders about nervously between brief resting periods and soon returns to the water, perhaps feeling that it *must* find some one to quarrel with.

A sea-elephant, when landing, crawls slowly up the strand, stopping to let the waves break over it and taking advantage of every swell to aid its progress. When it has reached the upper beach it rises to its full height and reconnoiters; then, proceeding a little farther, it repeats the action; or, if it spies none of its kind, it may take a siesta before continuing the search.

The large, wind-swept moraine beach in the Bay of Isles was a favorite place

FERAL HORSES OF CUMBERLAND BAY

These are the offspring of animals left on South Georgia by a German Antarctic Expedition. There are no indigenous terrestrial mammals on the island.

for sea-elephants of all sizes to "haul up." The western end of this beach, below the site of my camp, was covered with hummocks of tussock grass and a dense growth of "Kerguelen tea" (*Acæna*), the other three-quarters being a stretch of fine shingle, nearly bare of vegetation and inclosing four ponds, or chains of ponds, which were fed by some of the innumerable glacial streams that cross it.

During December about 250 sea-elephants were summering on various parts of this beach, and even after the sealers had sent these the sad way of their forefathers, whose bones lay scattered far and wide, others came up from time to time.

When we first arrived groups of the animals were occupying three different types of lairs, namely, the depressions or troughs between the tussock hummocks, grassy places on the banks of the streams and fresh-water ponds, and pockets of stagnant, fluid mud around the edges of the terminal moraine behind the beach-plain. Each cluster of sea-elephants lay as closely together as possible during the daytime, and all the lairs had a strong swinish smell.

The younger animals of the groups near the ponds entered the water more or less and indulged in many fights there; those in the mud-holes lay engulfed to the eyes and seemed to wallow thus for days at a time. At night all were noisiest and most active, some roving about, for in the morning I often found their broad tracks winding across the pebbly plain and sometimes leading a mile from the bay.

SEA-ELEPHANTS ON LAND MOVE LIKE INCH-WORMS

On a level surface sea-elephants can bob along faster than a man can walk, but pauses for rest are made at short intervals. Their mode of progression has been well likened to that of an inch-worm, yet when in a hurry they arch the spine and jerk forward the pectoral flippers with such rapidity that their resulting gait might almost be called a gallop.

ONE OF THE CREW OF THE "DAISY" DIGGING OUT SPECIMENS OF PETRELS

It is laughable to see a fat adult bounce along at full speed, with head jerking up and down and ponderous blubbery sides shaking. The hind flippers are, of course, not employed for travel on land, but are merely trailed.

Although going up hill is necessarily a slow and painful process for sea-elephants, they are nevertheless ambitious in that feat, especially on parts of the coast where the best growths of tussock grass are on hillocks near the shore. Not infrequently we found herds of the animals on the summits of promontories 70 or 80 feet above the sea, and in one instance much higher, atop a perpendicular cliff, which they had surmounted from the rear by clambering up an adjacent valley.

Later the seal hunters visited this place, and I was told that a stampeded cow had dashed over the brink of the cliff, falling more than 100 feet to the beach below, yet she scurried right into the sea and swam away vigorously.

When in the water, sea-elephants remain submerged most of the time, progressing by means of wide, sculling sweeps of the hind flippers, the blades of either limb working simultaneously. It is astonishing to see with what ease their huge bodies glide through the dense thickets of the giant kelp. I suspect that they capture a part of their food among the tangles of the kelp, for I sometimes found small rubbery pieces of the seaweed in their stomachs.

SLEEPING IS THE MAIN BUSINESS OF LIFE

Sleeping seems to be the main business of sea-elephants during the summer months. They sometimes take naps in the coves and ponds, either at the surface, with round backs just awash, or else down near the bottom, where they maintain a perfect hydrostatic balance. Ashore they sleep most of the time, usually lying belly up, and they often refrain from breathing for considerable periods by keeping the nostrils tightly closed, just as though they were under water. Still more often they make use of one nostril only, spreading and closing it with each breath, while the other remains shut all the time.

A sea-elephant's sleep is suggestive of nightmare or a guilty conscience. The inspirations of the breath are irregular gasps, the expirations tremulous wheezes. The body shakes violently from time to time, and the fore flippers are ever nerv-

A SOUTH GEORGIA TERN STANDING ABOVE ITS SINGLE EGG

The eggs and young of gulls and terns on the island are protected by obliterative coloration.

ously moving about, now scratching the sides, now the head, which is inclined downward until within their reach; next they may be crossed over the breast in order that one flipper may be scratched by the other.

The fingers of the fore flippers are very flexible, bending when employed in scratching quite like human fingers. The hind flippers are now and then spread fanlike and brandished in the air, or rubbed and clasped together like a pair of clumsy hands. Awake or asleep, they are fond of flinging sand or mud over themselves by scooping the earth backward with the palmar surface of the fore flippers.

All these motions often go on while the brutes are in such total oblivion that it is difficult to awaken them. I have tossed a handful of sand into the wide-open nostrils of a restless, sleeping bull, throwing it into a fit of coughing, yet it did not even open its eyes. In December a group of nine half-grown bulls, which I was careful not to alarm, lay sleeping beside a stream near my tent, and I believe none of them moved so much as its own length during 10 days, although they roused up for pugilistic encounters once in awhile and made considerable noise.

A fight between two old "beachmasters" is a sight to remember. The huge beasts rear up on their bellies to a height of eight or nine feet and hurl themselves forward, ripping each other's thick-skinned necks with their heavy canine teeth and emitting their curious strangled bellow between the clashes. They are well protected by a breastplate of hide an inch thick; but I have seen many bulls with old scars which extended clear through the blubber layer on the shoulders, and we killed one big animal which had lost a large portion of its snout.

BIRD LIFE A FASCINATING STUDY

The two dozen species of birds which breed on South Georgia offer a fascinating field for the study of certain biological questions, notably the struggle for existence. The titlark, the only land bird, has already been mentioned. The remaining birds belong to six distinct groups, as follows:

1. Three species of penguins, of which one is rare.

A PAIR OF SOUTH GEORGIA TEAL IN THE TUSSOCK GRASS

2. Thirteen species of *Tubinares,* the group comprising petrels, fulmars, albatrosses, etc.

3. One shag, belonging to a widely distributed Antarctic branch of the cormorant family.

4. A teal and a goose, the latter having been introduced from the Falklands by man.

5. A skua, a sea-gull, and a tern.

6. *Chionis,* the sheath-bill, an aberrant member of the snipe and plover family.

As would appear from this list, the Tubinares are far and away the dominant sea-birds of the Southern Hemisphere. In their evolution they have adapted themselves wonderfully to every life condition, and the existing species show wide differences in external structure, as well as the unusual range in size illustrated by a comparison of the Mother Carey's chickens with the wandering albatross.

The titlark, sheath-bill, teal, and goose of South Georgia are wholly or in part vegetable feeders. The cormorant and the tern eat fish. The gull subsists chiefly on limpets and other shell-bearing mollusks. The penguins and Tubinares capture cuttlefish and pelagic crustaceans, the giant petrel, or "breakbones," alone obtaining part of its food on shore, since it has a relish for carrion. The skua feeds on any kind of animal food, dead or alive, especially upon other birds and their eggs.

A CAPE HEN SUNNING ITSELF IN FRONT OF ITS BURROWED NEST ABOVE THE SEA

"The colonies of the subterranean breeders furnish most of the music of South Georgia, for at night the incubating birds pipe up in a tinkling chorus which often can be heard far out over the fjords" (see text, page 432).

This rapacious bird, the skua, well named *Megalestris,* or the "big pirate ship," is a fair subject for a whole volume on faunal relationships To all effects, the skua is a sea-gull which has turned into a buzzard-hawk. Along with its supposed change of habits it has assumed a hawk-like plumage, a heavy carnivorous bill, and long, sharp claws. It is the enemy of every living creature it can master, and it is probably responsible for a greater destruction of bird life at South Georgia than any other agency.

One wonders indeed, on seeing the variety and abundance of the skuas' food supply, why these birds do not increase indefinitely and overrun the island even more than they do at present. An answer is found in the fact that they sometimes eat their own offspring, and perhaps this is Nature's strange method of maintaining her balance.

Whatever liberties the skuas themselves may take with their progeny, they are averse to allowing any other creature within a couple of hundred yards of their nest. Often while walking unconcernedly over the tundra of the coast hills I have been savagely attacked by a pair of these birds, which fly at one's head with such force that they sometimes kill themselves by striking against a stick or gunbarrel raised up in defense.

If warded off for a while they will alight on the ground near by, raise their white-banded wings straight up over their backs and hold them there while they scream lustily at the intruder. When I first saw the skuas in this beautiful pose I realized at once that the upright wings on the helmets of the old Norse heroes were copied from the wings of kindred spirits, the skuas of Iceland and Scandinavia.

SKUAS WATCH FOR HOURS FOR A CHANCE TO STEAL

About the penguin rookeries skuas squat on their bellies hour after hour waiting patiently for a chance to steal an egg or chick. I sometimes made good use of them by allowing them to trim the

A GIANT PETREL DEFENDING ITS YOUNG

This bird protects itself and its chick by throwing the unsavory contents of its crop at an intruder.

meat and fat off the penguin skins I had collected. Once I had 35 skuas hard at work at one time. They fought continually, even when there was room for all, and one or two old champions usually monopolized each skin.

In fighting they raised their wings and jumped at each other like game cocks, except that they did not employ their claws. They knocked each other down in jolly fashion and pulled out tufts of feathers, the battle being half on the ground and half in air. The victor always raised his wings and screamed before returning to the banquet and driving off the birds which had slipped into his place while he was engaged.

If one bird flew away with a scrap of meat in order to devour it elsewhere, the others would suspect that he had a superior morsel, and immediately the whole pack would leave its plenteous repast and follow the fugitive, who was sure to be robbed unless he could contrive to gulp down his billful as he flew. When once a skua's capacious maw was filled, it would draw back a little, squat on the ground, and allow its rapid digestion to fit it for another meal.

In spite of their cruel and wanton dispositions, the skuas have a spirit of *bon camaraderie* which makes one love them. They crowd about a man on the beaches and look up with bright, fearless, unsuspicious, brown eyes; pick up the scraps that are thrown to them, and pay no more attention to the loudest shouts, handclaps, or whistles than if they were stone-deaf. When one talks to them in a low voice, however, they cock their heads and listen with an interest which is whimsical to see.

FIVE METHODS OF DEFENSE AGAINST SKUAS

With so powerful a foe as the skua, it is obvious that all other South Georgia birds must have some definite method of

A BLUE-EYED SHAG ON ITS NEST

The shag belongs to a widely distributed Antarctic branch of the cormorant family. The courtship of the shags goes on while the nest is building. Standing cheek to cheek, they bow their heads and twist their necks; then the male bird launches off on a short ecstatic flight and returns to resume the love dance.

defense during the breeding season. In the course of my observations I came to recognize five distinct methods, one or more of which is adhered to by each species.

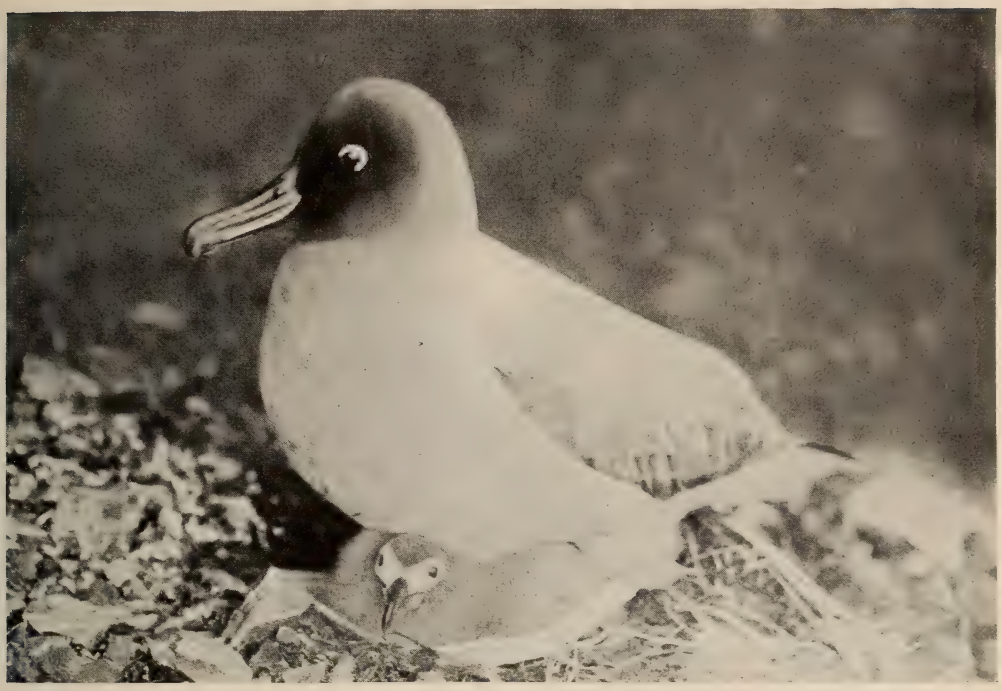
The penguins, albatrosses, giant petrel, shag, kelp gull, and tern all nest in the open, but these birds are singly, or at any rate in pairs, more than a match for the skua. The eggs and young of the gull and tern are additionally protected by their obliterative coloration. Concealment of the nest in the thick grass is the defense of the titlark, teal, and goose.

The teal is, moreover, a master at deceit, contriving by feigned lameness to lure enemies from the vicinity of its family, while the young ducklings disappear as if by magic among the tussock hummocks.

The remaining birds render their nests inaccessible by building them in clefts of the rock or in burrows. The sheathbill and the "Cape pigeon" (*Daption*), for instance, are cleft-dwellers; the other species, including whale-birds, divers, and Mother Carey's chickens, are burrowers.

The colonies of subterranean breeders supply most of the music of South Georgia, for at night the incubating birds pipe up in a tinkling chorus which often can be heard far out over the fjords. Some of the smaller species of these burrowers, especially the divers (*Pelecanoides*) and the whale-birds (*Prion*), dare not come out of their holes except under cover of darkness, but the skuas nevertheless succeed in capturing thousands upon thousands of those unfortunates which chance to be a few fatal moments late in getting back from sea in the early dawn.

The ground over a whale-bird colony is always strewn with acres of dismembered bodies of victims. Despite this destruction, however, and despite the fact that these birds lay only a single egg, the whale-bird myriads seen over the neighboring ocean are like the old flights of the passenger pigeon or a plague of locusts. It is a pure case of survival through strength of numbers.



A SOOTY ALBATROSS AND HIS YOUNG ON A LEDGE FAR ABOVE THE SEA

The father albatross seemed to try to calm the chick while it was being photographed. The young bird resembles a nestling vulture (see text, page 435).

A species which protects itself from the skua by concealment of the nest and constant guard of the young after the eggs have hatched is the Falkland upland goose (*Chloëphaga*). This fine bird is *persona non grata* with sheep ranchers in the Falkland Islands simply because it was designed by nature to feed upon grass, and hence is considered an impediment to the fattening of mutton; so it has been outlawed and a bounty placed upon its head.

FIVE GOSLINGS RETURNED TO THEIR WAITING PARENTS

Some years ago Mr. Wilson, British magistrate at South Georgia, imported several pairs of upland geese from the Falklands at his own expense, and freed them in the admirably adapted grassy country of Westfjord, Cumberland Bay. The geese have since increased and spread encouragingly, and are there assured of a sheepless future and a home where the species may exist after extermination in its original habitat.

The cabin boy of the *Daisy* one evening came aboard in high glee, bringing me in his pockets five very young goslings which he had captured in one of the Westfjord lakes. Ordinarily I should have been delighted to receive specimens, but in this instance I felt constrained to carry the lively goslings back to their home, and in case the parents did not appear after a time, to attempt to rear them in captivity; but the former experiment was a complete success.

Arriving next morning at the lake, we saw several pairs of upland geese lurking on the far side. One of the goslings peeped, and immediately a guttural clucking came in answer from across the water, and a barred goose began to swim straight toward us, followed at a discreet distance by the snow-white gander.

We put the young brood in the lake, but each gosling attempted to scramble out until it heard the call of the approaching mother, when all five turned their tails and swam bravely away. The parents joyfully received their family again and the flotilla disappeared around a point, with the youngsters well guarded, side by

WANDERING ALBATROSSES COURTING—THE KISS

The wooing of the albatross is one of the curiosities of the bird world (see text below).

side between the goose and her pompous mate.

HOME OF THE ANCIENT MARINER'S BIRD

The great, white, wandering albatross, the bird of the Ancient Mariner, is a true embodiment of the spirit of South Georgia. These splendid creatures nest in large colonies on the islets and grassy promontories in the Bay of Isles. Within a stone's throw of my camp seven pairs carried on their courtship and breeding.

In December many of the dark-colored young of the previous year, with patches of gray down clinging to their plumage feathers, were still lingering about the colonies; but with the advent of a new breeding season these backward youngsters were no longer fed by their parents, so they soon learned to fly and went off to sea.

The wooing of the albatross is one of the marvels of the bird world. An unattached female is commonly besieged by several suitors, whose advances are most amusing, as they throw forward their breasts, stretch out one or both of their great wings, and squeal beseechingly, each trying to confine the female's attention exclusively to himself. Now and then a male will turn upon his rivals, expressing his opinion of them in a gobbling jargon which is doubtless intended to be abusive. They threaten each other, too, with their terrible beaks, but I saw no actual fighting.

For a time the female wisely distributes her favor about equally among the wooers, but when a choice has finally been made the disappointed males walk away, with heads swaying from side to side and hung almost to the ground. They have a diabolical look, like the outwitted villain in a melodrama, and it is easy to imagine that dark and sinister thoughts occupy their minds (see page 435).

PARENT BIRDS DO 10-DAY TURNS OF DUTY ON THE NEST

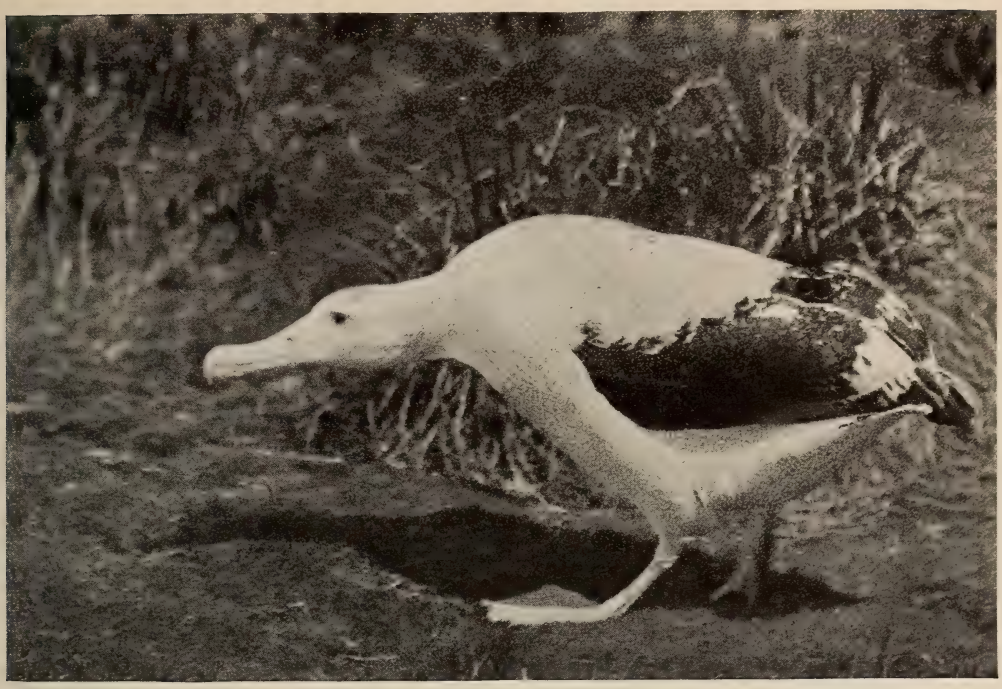
The nest of the wandering albatross is a large truncated cone of earth and tussock stalks. On this platform the bride sits, with her mate squatting in front of her. They cross their bills, stroke one another's necks, and chatter, making the mandibles vibrate so rapidly that only a blur can be seen. Sometimes they point their bills straight upward and squeal like young pigs. A resonant clap of the bill and an assortment of grunts, gobbles, and caterwauls complete the song repertory.

Now and then the male rises, takes a few stately, deliberate steps, and then poses before his lady with head held high and both wings outspread—12 feet from tip to tip—a come-to-my-arms attitude indeed. This seems to be a sign for the female to come off the nest; the male steps on and takes his mate's place, bowing, and declaring his devotion without cessation.

After the single egg has been laid, one bird goes off to sea, remaining from six to ten days, while the other stays at home without feeding, sleeping much of the time with its head tucked under its wing-coverts. The approach of a skua will cause it to rouse up and snap its beak; but nothing can persuade it to leave the nest, even for an instant, until its mate comes to relieve it. The returned parent has evidently filled up on cuttlefish during its holiday, for in the following period of domestic duties it regurgitates little piles of the indigestible beaks of cuttlefish about the base of the nest.

The division of labor in the albatross family, based doubtless on very ancient principles of equal rights, continues throughout the period of incubation.

In order to launch into flight, the wan-



THE DISAPPOINTED SUITOR

After the female bird has made her choice from among several albatross admirers, the rejected swains walk away with heads swaying from side to side and hung almost to the ground. "They have a diabolical look, like the outwitted villain in a melodrama" (see text, page 434).

dering albatross, like its inferior copy, the airplane, must have starting room. The huge bird sets its wings, runs rapidly down a slope, and presently glides off the sluggish earth into its own living element, and then only can its full grandeur be appreciated.

THE SOOTY ALBATROSS IS THE PERFECTION OF GRACE

Of different habits is the sooty albatross (*Phœbetria palpebrata*), a dark-colored species which reaches the very pinnacle of perfection in flight, exceeding in grace even its larger relatives.

The sooty albatrosses nest on perilous ledges wherever mountainous headlands rise abruptly from the sea, and while one parent is covering the egg, the other may often be seen sailing, with inspiring, effortless motion, back and forth, back and forth, always passing close to its nest and gazing with a white-ringed eye at its quiet mate.

I saw plenty of nests, crowded against the rough faces of sheer cliffs, as high as 700 feet above the sea, but during nearly four months' search I found only three that a man could possibly have reached. Two of these were in Sea-Leopard Fjord, Bay of Isles. One nest was within 100 feet of the beach; the other about 12 feet above the first, and both sheltered by an overhanging rock wall.

On January 20 I clambered up to the lower site with a camera. The male parent, which was brooding a downy chick, grunted softly and snapped his bill with a hollow chop. He was comparatively trustful, however, and when I had backed away about six feet (as far as the ledge would allow) he snuggled down and began unconcernedly to draw blades of grass through his bill, now and then glancing at me with a solemn, wide-eyed expression caused by his curious, broken, orbital ring (see page 433).

Presently the youngster stuck its head out from beneath its sire. It looked like a nestling vulture because the feathers on the head were very short, while long down covered the rest of its body. It snapped its soft little bill at me just as

A SPECTACLED ALBATROSS GLIDING

TWO SPECTACLED ALBATROSSES CROSSING IN FLIGHT

KING PENGUINS ON THEIR NESTS

"These are the hereditary aristocrats of South Georgia. They wear gold collars around their necks, and on land deport themselves in a lofty and snobbish manner."

the old bird had done. The father albatross seemed to try to calm his baby. He bent over it and kept touching its head with his bill. All his actions showed tenderness and pride; I never saw another bird act quite so much like a human parent.

When I took the youngster out of the nest it immediately crawled back, in spite of its very weak legs. The instinct to lie in one particular spot from birth until flight is possible, is strongly developed in this species. It is easy to understand, on once visiting the sooty's precarious cradle, that natural selection could not fail to weed out all restless, fidgety baby albatrosses, preserving to perpetuate the race only those which are content to lie low and wait.

THE COURTSHIP OF THE SHAGS

Down below the eyries of the sooty albatrosses, on the lower ledges of South Georgia cliffs, the blue-eyed shags nest in populous rookeries. They are far more beautiful birds than our northern cormorants, having iridescent blue-green backs and snowy throats and breasts. Moreover, they are better humored; they never threw up the fishy contents of their stomachs at me when I climbed to their nests, or attempted to bite when I stroked their backs.

The courtship of the shags goes on while the nest is building. A pair stand side by side, put their cheeks close together, and bow down their heads and necks. Then, twisting their heads, they put the other cheeks together in the same way and curtsey again. This graceful minuet figure is repeated for some time, and then the male launches off on a short ecstatic flight, from which it returns to resume the love dance.

After the two or three greenish eggs have been laid, the shags are still enraptured lovers, remaining together at the nest much of the time, caressing one another and making low croaking sounds in their throats.

One day I visited a nest just as the eggs were hatching. While I was inspecting a naked, black shaglet hardly out of its shell, both parents stood by with bills

KING PENGUINS TAKING TO THE WATER

These birds have a terrible aquatic enemy in the sea-leopard, a large flesh-eating seal.

parted and throats and mandibles trembling violently, just as when one's teeth chatter. It was an unmistakable demonstration of extreme solicitude. A few days later the nestlings were beginning to sprout their dusky down, and horribly ugly little monsters they were, with black bodies, pink throats, blue bills, and Hottentot tufts all over their turtlish forms. Exactly 49 days after the date of hatching they flew from the nest and began to catch fish for themselves.

TWO TRIBES OF PENGUINS ON SOUTH GEORGIA

Two species of penguins are still common at South Georgia, although in many of the fjords their numbers have been greatly reduced through the ravages of whalers and sealers, who collect their eggs for eating.

The nobler tribe of penguins, the "kings" (*Aptenodytes patachonica*), form a sort of hereditary aristocracy. They are stalwart birds which stand a yard high. They wear a gold collar round their necks, and deport themselves in a rather lofty and snobbish manner. The members of the lesser tribe, called "Johnnies" (*Pygoscelis papua*), are characterized by short, roly-poly figures, and temperaments which include many attributes of the small boy, among them inquisitiveness, good nature, and a certain degree of quarrelsomeness. The two species follow the same vocation and dwell in the same territory, yet their society is inviolably distinct.

In the December of Antarctic springtime, when the *Daisy* dropped anchor in the Bay of Isles, the Johnny penguins were the first creatures to greet us on the strand. We had met them before in the wide sea some hundreds of miles north of South Georgia; but how different seemed the slippery, reptilian beings, which had thrust their heads out of the dark Atlantic with a braying cry, from these warm, plump little citizens which trudged toward us along the beach, hesitating now and then between curiosity and fear.

The Johnny penguins build bulky nests of stones and vegetable debris and lay two nearly spherical eggs. The eggs usually hatch several days apart, one

THE KING PENGUIN OF "MOTH-EATEN" PLUMAGE IS MOULTING

"After the nesting season is over the adults undergo their annual change of clothes, and for a time they have a very ragged appearance, the old, worn-out feathers coming off in patches, like the hair of a shedding buffalo" (see text, page 440).

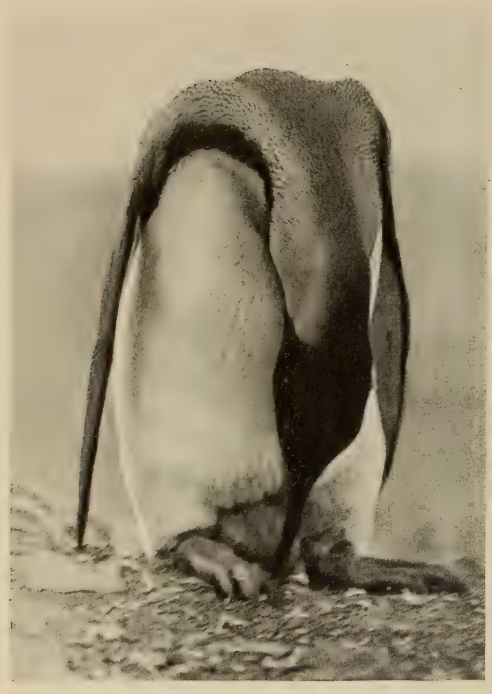
chick consequently being much larger than the other during the whole period of growth. Many of the nests I visited contained only one young bird, the skuas having accounted for the other perhaps before it had ceased to be an egg.

When a brooding penguin is driven from its eggs or young nestlings, it lingers near by, trumpeting loudly until the disturbance is over; then it examines the nest very minutely, stooping down over its treasures like a near-sighted person, and scrutinizing one and the other over and over again. When satisfied that all is well it settles down contentedly.

The parents hiss sharply whenever a skua approaches, and sometimes they even rush at one as it stands evilly watching for a nest to be momentarily neglected.

PENGUIN AWKWARDNESS VANISHES IN THE SEA

Strangely enough, the Johnny penguins often locate their colonies on the summits of bare hills long distances from the sea. Every day they trudge back and forth between the nest and feeding ground, along well-worn paths, balancing their upright bodies by thrusting their



KING PENGUIN TUCKING THE EGG INTO ITS "POUCH" AFTER RELIEVING ITS MATE

These birds build no nests, but carry their single egg on top of their feet, covering it with a flap of skin. If a bird is robbed of its egg, it will attempt to mother a stone.

wings backward, and paying no attention to the countless neighbors which they pass on their way.

Once in the ocean, however, all their awkwardness vanishes. They swim with incredible speed, remaining well below the surface except when they leap out porpoise-like, giving an audible gasp for air—to be gone again within the twinkling of an eye.

Their fat bodies seem to be made to stand hard knocks, for not only do they tumble down frequently wherever the walking is rough on shore, but they also suffer fearful batterings on the shingle when they come out of the surf, sometimes being bowled over by four or five successive breakers before they can scramble out of the undertow.

Toward the end of January the young Johnny penguins, fully grown, but still clad in the softest of gray, furry down, permanently desert the nests and congregate by themselves, under the guard of adult nurses. On bright days they herd together on snow-banks and sun themselves; when it is stormy they crouch from the wind in sheltered hollows. They are dependent upon the old birds for their food, which is predigested minced shrimp, until March, for they never enter the water until they have doffed their down and have acquired the adult coat of close scale-like feathers.

After the nesting season is over the adults undergo their annual change of clothes, and for a time they have a very ragged appearance, the old, worn feathers coming off in patches like the hair of a shedding buffalo. The temporary loss of the tail, a luxuriant organ which the Johnny penguin can ill afford to be without, gives them a more dumpy outline than ever.

The penguins have a terrible aquatic enemy in the sea-leopard, a large, flesh-eating seal. From the stomach of a sea-leopard I had shot I once took the remains of four king penguins. On the land, however, these birds have no aggressor save the skua.

FOX TERRIER PLAYS PRANKS ON JOHNNY PENGUINS

The Johnny penguins showed not the slightest fear of a fox terrier belonging to the *Daisy* until the rascally dog acquired the habit of seizing them by the tails and swinging them round and round merely for the fun of it. After such treatment the poor Johnnies would huddle back to back in a sort of Macedonian phalanx, striking outward with their quick wings at whatever point the terrier attacked them.

The king penguins of South Georgia breed on low ground well back from the salt water. They build no nests, but carry their single egg on top of their feet, covering it with a flap of skin on the lower belly. If a bird is robbed of its egg, it appears quite dumfounded and will perhaps attempt to mother a stone.

The breeding season begins later than that of the Johnny penguins and continues all summer, some birds not laying an egg until March. The sexes alternate about every 24 hours in the duties of incubation. Young king penguins, unlike the young Johnnies, retain their thick down all through the first winter, acquir-

ing their plumage coats and migrating to sea when they are eight or ten months old.

The incubating kings can shuffle along slowly in spite of the egg on their insteps. They are fond of crowding together closely, yet seemingly for no better purpose than to facilitate quarreling. The sitters glare at each other, with sinuous necks twisted and heads cocked sidewise, and deal resounding whacks with their flippers, or lunges with their sharp bills, to all their neighbors. Often whole groups will be engaged in an indiscriminate skirmish with these rapiers and broadswords, and it is a wonder that no harm comes to the eggs.

THE SUPERIOR ATTITUDE OF THE PROSPECTIVE PARENT

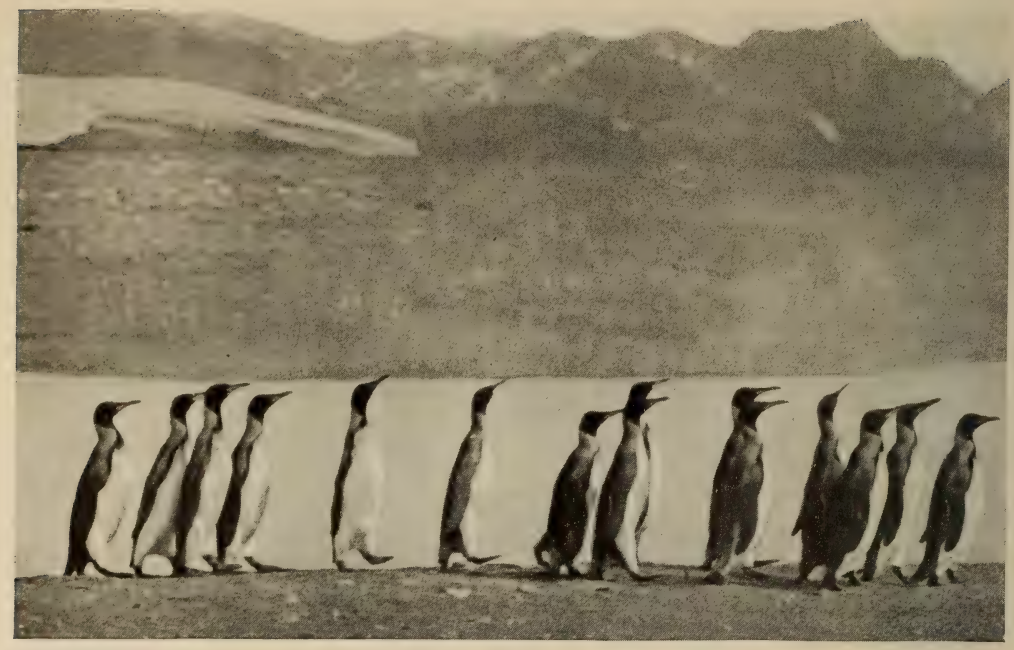
THE KING PENGUIN TRUMPETS LIKE A SOLDIER

A band of king penguins makes a glorious display when the morning sunlight shines on the golden throats and orange ear-patches of the soldierly birds. Sometimes the brigades, scattered here and there over the beaches and moraines, hail and answer each other with long-drawn, martial, bugle calls, and then, as if at a concerted signal, all will start marching toward the sea. Sometimes the birds stand together on the sunny side of a snowdrift, preening their feathers, "marking time," or even performing the difficult stunt of balancing themselves on one foot and scratching their heads with the other.

When a king penguin trumpets, it stretches grandly to its full height, points its bill skyward, and the long volley rings forth from an expanded chest. At the close of the call the head is tilted forward with a jerk and the bird stands at "attention"—a rigid, histrionic pose always held for several moments. The persistence of an ancient instinct is shown in the fact that both the king and Johnny penguins often sleep with their bills behind their "armpits," where ages ago the ancestors of penguins may have had warm wing-coverts.

HEADING HOMEWARD

The study of life in a new, strange phase made the weeks pass quickly at South Georgia. The gales and the snow and sleet came day after day, with only an occasional burst of sunshine, but each morning saw a new unfolding in the life histories of remarkable animals, many of which will soon have disappeared from



KING PENGUINS "MARCHING THROUGH GEORGIA" (SEE PAGE 441)

These stalwart royal birds stand a yard high. Their plebeian cousins, the Johnny penguins, are short, roly-poly figures, and have many of the attributes of the small boy, including inquisitiveness, good nature, and quarrelsomeness.

INCUBATING KING PENGUINS FIGHTING

The flippers moved so rapidly that the camera failed to stop them sharply. These birds hail and answer each other with long-drawn, martial bugle-calls, and then, as if at a concerted signal, a whole brigade will start marching toward the sea.

A PAIR OF JOHNNY PENGUINS AT THE NEST

Unlike the king penguins, which build no nests but carry the single egg on their feet, the "Johnnies" build bulky nests of stone and debris and lay two nearly spherical eggs.

TAKING TO THE TALL GRASS

The fat little bodies of the Johnny penguins seem to be made to stand hard knocks, for frequently they tumble down while walking over rough ground, and they also suffer fearful batterings when landing through a heavy surf.

A JOHNNY PENGUIN CROUCHING SOLICITOUSLY OVER ONE EGG AND ONE CHICK

The eggs usually hatch several days apart, and one chick is consequently much larger than the other during the whole period of growth. When a brooding penguin is driven from its nest, it lingers near by, trumpeting loudly until the disturber has withdrawn, then it examines the nest minutely, stooping over its treasures like a near-sighted person. When satisfied that all is well, it settles down contentedly again.

the earth forever unless the British Government awakens to its responsibility.

Toward the end of the Antarctic summer—that is, about the last of February—we weighed the *Daisy's* two heavy anchors and tacked in the teeth of an easterly wind along shore out of the Bay of Isles and in through the narrow mouth of Possession Bay, where Captain Cook so many years before had landed and, "under a discharge of small arms," had claimed the snowy isle for his king.

We moored near the head of this comfortless bay before a semicircle of perpendicular glacier walls. The hills shut off every view save to the north, where the distant sea heaved beyond the entrance and long rollers broke on a bar which almost inclosed the inner haven. On the eastern shore a valley, crowded between a pair of pointed, symmetrical mountains, narrowed to a boulder-strewn pass and led to the cliffs above Antarctic Bay.

Little verdure could be seen anywhere from the deck of the ship. A penetrating wind howled and howled down the white-shrouded hills. The pale sunlight seemed to have lost its power to cheer. It was like issuing from a refrigerator when on March 15 we pointed the good brig's prow toward the open sea and began the long voyage home.

Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your June number, the Society should be notified of your new address not later than May first.*

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"WHERE THE MOUNTAINS WALKED"

An Account of the Recent Earthquake in Kansu Province, China, Which Destroyed 100,000 Lives

By Upton Close and Elsie McCormick

With Illustrations from Photographs by the Hayes-Hall Kansu Earthquake Relief Expedition

MOUNTAINS that moved in the night; landslides that eddied like waterfalls, crevasses that swallowed houses and camel trains, and villages that were swept away under a rising sea of loose earth, were a few of the subsidiary occurrences that made the earthquake in Kansu one of the most appalling catastrophes in history.

Though the tremendous shaking-up occurred in December, 1920, the story is only now beginning to spread beyond the narrow defiles which guard the entrance to Kansu Province. It is, perhaps, the most poorly advertised calamity that has occurred in modern times.

Though Kansu is within telegraphic reach of the rest of the world, the details of the disaster have never come over the wires. The native population was too stunned and the few foreign residents were too busy in relief work to give any description of the dancing mountains and vanishing valleys.

Mr. Josef W. Hall (Upton Close), who visited the earthquake area under the auspices of the International Famine Relief Committee, has brought back one of the first accounts of the devastated country and the strange things that happen when the earth turns itself into a contortionist.

The area of destruction, 100 by 300 miles in extent, contains ten large cities, besides numerous villages. In it is the heart of the so-called loess country, where the soil is a mixture of clay and powdered quartz. A narrower region was comprised in the landslide district, where the loose earth cascaded down the valleys and buried every object in its path.

A MOSLEM FANATIC AND HIS FOLLOWERS SEALED IN A CAVE

Tales as strange as any that Roman historians have told of Pompeii are recounted by visitors to the devastated country. As three-fifths of the dead are Mohammedan, the non-Moslem Chinese claim that the earthquake was a visitation from Heaven against the disciples of the Prophet. Somehow, the Mohammedans have failed to deny this accusation with their usual vigor and have suddenly become surprisingly humble.

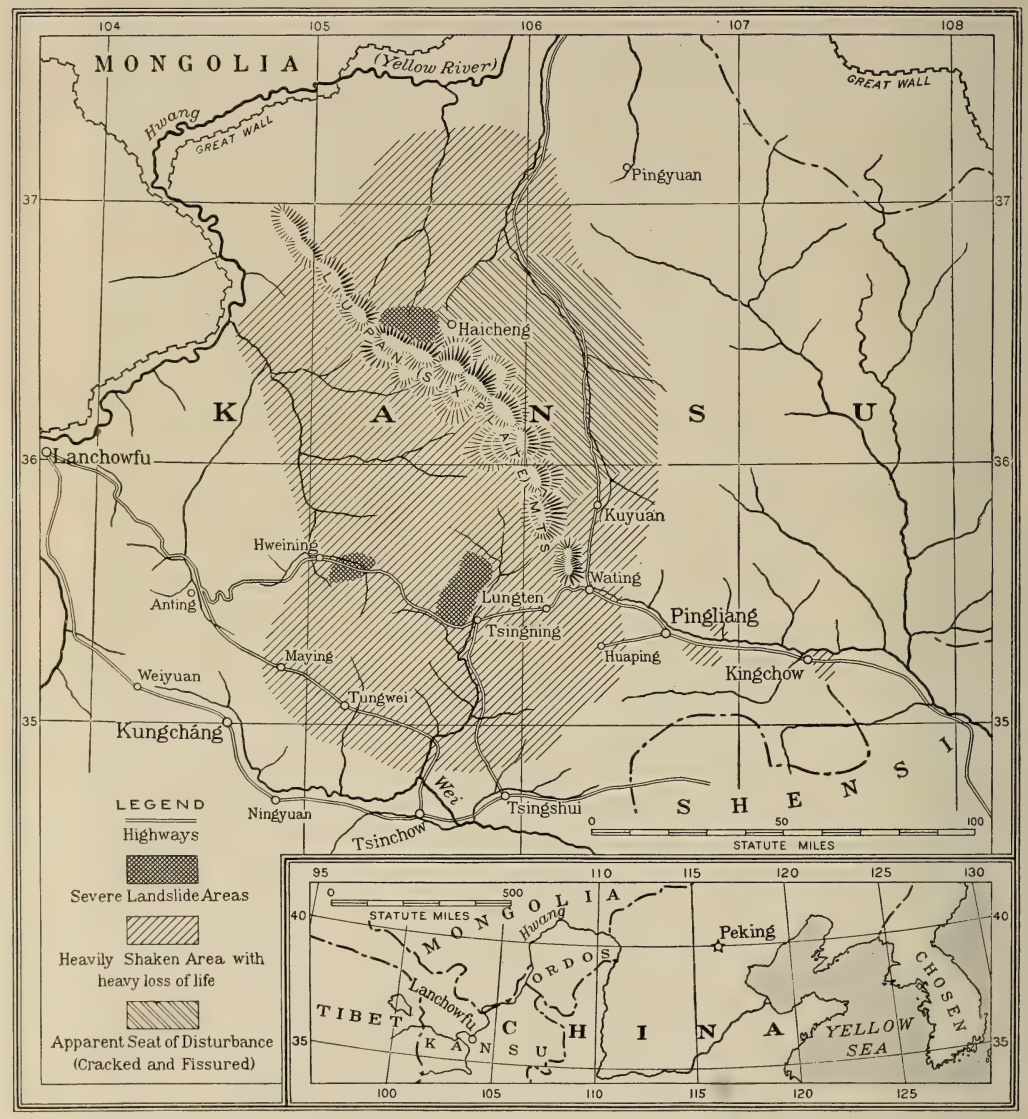
One of the most dramatic episodes of the disaster was the burial of Ma the Benevolent, a famous Moslem fanatic, and 300 of his followers, just as they had met in conclave to proclaim a holy war. The cave in which they had gathered was sealed by a terrific avalanche, while the group knelt on their prayer-mats.

A CAVE INN IN THE LOESS REGION, WITH MEMBERS OF THE RELIEF EXPEDITION IN THE FOREGROUND

This is outside of the quake belt, but gives an excellent idea of how cave homes of the district looked before the disaster.

THE AREAS OF VALLEY-FLOOR LAND COVERED BY LOOSE LOESS FROM THE HILLS ARE TREMENDOUS

The traveler over these wastes of earth, under which are buried villages, farmsteads, stream-beds, and road-beds, is overcome by the weird feeling that he is on some planet still in the formative stage. The horses appear to have an equal sense of the uncanniness of the situation and cannot be persuaded to leave the few trails which have been pounded down over the soft, dry, treacherous earth.



Drawn from a sketch by Josef W. Hall

A MAP OF THE QUAKE-STRICKEN AREA IN KANSU PROVINCE, CHINA

By some miracle, the watchman at the entrance to the cave escaped with his life, but the others were buried so deeply that, despite months of digging over an area of a mile, the Moslems have failed to recover the bodies of their leaders.

A HIGHWAY RIDES ON THE CREST OF THE QUAKE

In another district Mr. Hall and his party found that a whole mountain topped by a temple had slid into a valley. A little beyond they found that a road bordered by poplar trees had ridden the crest of a slide for three-quarters of a mile, without apparent damage to the trees or even to the birds' nests in their branches. One astonished peasant looked out of his window in the morning to find that a high hill had moved onto the homestead, stopping its line of march within a few feet of his hut.

In another village the only people left alive were a couple over seventy years old. They were saved from death only by the fact that their children, displaying a

THE TELEGRAPH OFFICE OF KUYUAN, FROM WHICH THE FIRST WORD OF THE DISASTER WAS SENT OUT

The operator sat on the frozen ground with his transmitter on a bench before him. The building and all the telegraph instruments except one, as well as all lines except the one running northward to the Yellow River, were destroyed by the quake. These enterprising operators were, a month later, compelled to carry on in a shelter built of mats, cloth, and doors, since the Peking government was too busy financing war lords to attend to their plea for money to rebuild. The Chinese telegraph system, penetrating to far Mongolia and Turkestan, is little short of marvelous. Its farthest stations are as far away from Peking as London is from New York.

strange lack of filial piety, had sent them to live in a house on the outskirts of the clan village which was buried by an avalanche. The death of their descendants was taken as evidence, by survivors in the neighborhood, that Heaven had punished the family for its lack of filial respect.

SEVEN GREAT SLIDES CRASH THROUGH THE VALLEY OF THE DEAD

In the city of Tsingning the chief magistrate was found living in a canvas tent over his demolished yamen. In the same city two American women missionaries were dwelling in a hovel with earthern floor and a mat-shed roof that would be scorned by well-bred live stock. Though they had been offered better quarters, the mission workers had refused to accept them, preferring to share the hardships of their people.

The most appalling sight of all was the Valley of the Dead, where seven great slides crashed into a gap in the hills three miles long, killing every living thing in the area except three men and two dogs.

The survivors were carried across the valley on the crest of the avalanche, caught in the cross-current of two other slides, whirled in a gigantic vortex, and catapulted to the slope of another hill. With them went house, orchard, and threshing-floor, and the farmer has since placidly begun to till the new location to which he was so unceremoniously transported.

In a small town on the highway two strangers had put up at the inn on the evening of the disaster. In the terror and confusion that followed the earthquake, the landlord completely forgot his two guests. It was not until several days later that he remembered them, and when,

ALL THAT IS LEFT OF THE TERRACED FIELD IN THE MIDDLE DISTANCE IS THE LITTLE ISLAND OF EARTH

Apparently the island is firmer than the earth on either side of it, for it divided the avalanche of dirt into two mouths.

AT THE FOOT OF A SLIDE WHICH BURIED A VILLAGE ON THE VALLEY FLOOR

The few survivors, following instinct, endeavored to remain as near as possible to the original site of their homes, and at the foot of the slide erected hovels, in which they spent the winter. Shocks were so recurrent that the survivors feared to erect structures substantial enough to do injury should they collapse. As a result, many perished of the cold during the severe winter (the altitude being from 4,000 to 6,000 feet above sea-level). The usual heated-brick beds, or kangs, were not installed in the inadequate shelters for fear of repetition of the casualties which occurred when the kangs broke through during the quake and dropped the sleepers, mostly women, into the fires below.

after considerable digging, their room was brought to light, both men were found alive. Stupefied by the shock, they knew nothing of what happened and imagined that they had slept through an ordinary night. The landlord, however, in spite of remonstrances, did not neglect to collect room rent for the full period of their stay.

One of the districts that has suffered most is the tableland to the north known as the bunch-grass country, which supplies the camel crop for practically all of Asia. The soil is an unyielding alkali, which cracked appallingly, since there was no loess cushion to mitigate the force of the shock. In one town with a normal population of several hundred the investigators found only twenty or thirty survivors.

The loss of nearly two hundred thousand lives and the total destruction of hundreds of towns and cities calls for reconstruction work on a staggering scale. Seven thousand men have been employed by the United International Famine Relief Society in releasing dammed streams and thus preventing disastrous overflows. Their work and that of their brave foreign superintendents, now nearing successful completion, is a romance of adventure in itself.

Fortunately, there is no orphan problem, as children in the devastated districts were so much in demand that they were promptly adopted by the survivors. In Kansu, as in most pioneer countries, men are so much in the majority that women are highly valued. The usual price for a wife ranges from 100 to 300 taels, and, as a result, girl babies are adopted as eagerly as the boys.

THE CHINESE DRAGON WAGGLES HIS TAIL EVERY THIRD CENTURY

Of that most remarkable series of seismic disturbances which occurred throughout the world in November and December, 1920, the most phenomenal was

THE MAGISTRATE OF TSINGNING LIVES IN A TENT ON THE SITE OF HIS RUINED YAMEN (COURT BUILDING)

This official is codirector of the relief work in his district. His wife, an unusually progressive woman, and his son are also shown in the picture.

A THRESHING-FLOOR, ONCE LEVEL AS A DANCING FLOOR, CRACKED UP INTO MANY LEVELS BY THE QUAKE

Note the effect on the compound wall. Six hundred sheep were buried in the collapsed caves at the rear.

LOOKING INTO THE RUINED TOWN OF WATING THROUGH A HOLE SHAKEN THROUGH THE CITY WALL BUILT OF LOESS

This was one of the freaks of the disaster. Some of the buildings in the foreground have been repaired.

undoubtedly the great Kansu earthquake of the late evening of December 16.

Owing to the unusual character of the loess, under the immense deposits of which the rockslip occurred, fantastic effects were produced upon the surface of the earth which give the observer the weird feeling that he is on some planet still in the formative stage.

The subterranean dragon of Chinese cosmology who, according to the northwest China tradition, waggles his tail every three hundred years, this time played havoc, such as was never before recorded with the face of the earth and the habitations of men. Likely no other earthquake in scientific annals ever changed the *physical geography* of the affected region to the extent of the Kansu cataclysm.

The region is one of seismic disturbance, but local archives, purporting to register the events of the past four thousand years, record only two earthquakes approximating the recent calamity in destructiveness. One was in the Tang dynasty, 1,200 years ago, affecting most severely an area in the north of Shensi Province, 200 miles to the east of that now in ruins; and the other under the Mings, three hundred years ago, which struck southeast, from the Kansu border to Sianfu. Ancient monuments and works of sculpture still bear mute evidence to these two disturbances.

The area most heavily affected by the recent disaster—what one might call the area of supreme destruction, where no brick-and-mud building was left in a habitable condition—is, as shown by the accompanying map (page 448), an oblong lying between the Wei and Yellow rivers, 170 miles long and 150 miles wide. It comprises two distinct types of geological formation, at least on the surface, which fact adds great variety and interest to the occurrence.

"THE FOOTSTEPS OF THE GODS"

The southern half of the oval, stretching from the northern bank of the Wei River to Kuyuan, is, with the exception of the precipitous mountain range cutting it from north to south not far from its

SAVED BY INCHES

Here the "mountain walked" from the range seen in the background, three miles distant, across the valley and towered over the village wall of Swen Family Gap, sparing the farmyard and haystacks of the peasant seen in the picture (see text, page 463).

TEMPORARY HOVELS OCCUPIED BY REFUGEES

WHERE THE BRITTLE GROUND CRACKED LIKE A PORCELAIN DISH

It took months to build a road with a dependable surface through this area, and even now a camel or horse will sometimes sink a leg through into some hidden crevasse. Shocks still recur in this district. They are attended by noise, and the earth trembles as if a fast train were passing underneath.

eastern edge, a part of the great loess region which stretches from central Honan almost to Tibet.

It is in the loess area that the immense slides out of the terraced hills occurred, burying or carrying away villages, covering level, farmed valley floors with a debris of unvegetated dust, damming stream-beds and turning valleys into lakes, and accomplishing those hardly believable freaks which the natives name the "footsteps of the gods."

Here the Chinese, since their vernacular is devoid of a technical or other term corresponding to "landslide," have coined the expression—the only phrase they have for describing what has happened—"The mountains walked" (*Shan tso-liao*).

The northern half of the oval, from Kuyuan to the Yellow River, is a rolling alkali plateau of clay and gravel formation, a part of the steppes stretching north to Siberia and west to Turkestan. In this district the soil, being of brittle but firmer texture than the loess, did not slide, but cracked into intricate fissures.

The summits of the high Six-Plate (*Liu Pan*) range, consisting of rock of volcanic origin protruding several thousand feet above the loess deposits on either side, although in the heart of the earthquake belt, were not shaken seriously. The slip apparently occurred in the rock-bed underlying the hard plateau and the loess, and sent vibrations to the surface in varying degrees of intensity, according to the nature of the soil and the thickness of the loess blanket, which acted as a cushion. The vibration was only slightly transmitted to the volcanic strata of the mountains.

NEWS OF THE DISASTER LONG DELAYED

The remoteness of the district in which the earthquake occurred cannot but intrigue interest. Although the concurrent quakes in Chile and Salvador, the tidal wave of Yap and the eruption of Mt. Asama, Japan, are all history, the Kansu disaster is still news. What actually happened in this frontier province of China is only now, through the reports of the

A VILLAGE IN THE HARD-HIT MOSLEM AREA

Bodies of men from the ruined homes to the right were left in the main street. The wall to the left was erected after the disaster but partially destroyed by a succeeding shock.

TWO PEOPLE SURVIVED IN THE VILLAGE WHICH ONCE OCCUPIED THIS SITE

The family of the Du's, as well as their clan village, lies under this pile of earth, with the exception of this house on the outskirts occupied by the old grandfather and grandmother. It was covered at the rear and one side as high as the ridgepole (see text, page 448).

RUINS OF LUNGTEH YAMEN

The magistrate was absent from his post at the time of the disaster, but his wife was killed.

MOLDING WALLS OF LOESS

The method is not greatly different from that employed in the Occident in making concrete structures. The loess wall will last, apparently, almost as long as concrete, if not exposed to over-much moisture.

A GASH IN THE HILLS LEFT BY A LANDSLIDE WHICH COVERED A VILLAGE

AT THE FOOT OF THE SLIDE SHOWN IN THE PICTURE ABOVE

The earth spread out over the valley floor, completely obliterating the original topography, including river-bed and highway. Travelers are seen making their way along the new road which is being gradually packed down over the soft earth. The wave trough and vortex formation taken by the torrent of earth is plainly discernible. The scaly appearance is caused by the broken-up valley floor sod. The avalanche plowed its way under the sod.

A HIGHWAY CARRIED ONE MILE ACROSS COUNTRY

This was the most striking freak of the earthquake. A quarter-mile section of an old road, with the big poplars which line it, was cut off from the highway by a landslide and carried on the back of the river of earth for nearly a mile, where it was left in an almost natural position. All this took place in a few seconds of time. The conformations and waves into which the swirling earth resolved itself are plainly seen.

relief investigation expedition of which Mr. Hall was a member, being made known in any comprehensive way, even in China's capital and port cities.

Kansu, in ancient times the buffer state between the glorious seats of the old Shensi dynasties and the Tatar and Tibetan barbarians, lies to the west of Shensi and northwest of Szechwan, pinched between the Ordos and southern Outer Mongolia on the north and east and the Kokonor region of Tibet and Sinkiang province of Chinese Turkestan on the south and west.

It is a country of extreme ethnographical and religious interest, being the meeting and mixing place of Buddhist Tibetans and Mongolians, Mohammedan Chinese containing a Caucasian strain, and the ordinary Chinese of the "big-church."

Had the quake disaster struck several hundred miles to the north, west, or south, the loss of life would have been negligible. As it happened, it selected for destruction, in the agriculturally rich, terraced loess country of the southern half of the affected area, the most populous portion of the province; and to the north, although this part is principally uninhabited grazing land, several of the largest Mohammedan Chinese cities, which were leveled.

Although the density of population is not more than one-tenth that of Shantung or the East China plain, the loss of life from landslides, collapsed cave homes, and falling buildings, together with death from exposure of the unsheltered in midwinter in this high altitude, was, according to official figures, 200,000, and according to the estimate of the foreign investigators more than half this number.

The reverend John D. Hayes, of the United International Famine Relief Committee, Peking, and Mr. Hall, leaving the Kwanyintang, Honan, railhead on March 6, 1921, took the ancient royal highway through Shensi to Kansu, crossing the Kansu border near Kingchow and proceeding directly to Pingliang, the great

IN SOME CASES THE HILLSIDES SLID AWAY, LEAVING GASHES THROUGH THE TERRACED FIELDS AS REGULAR AS IF SCOOPED OUT BY A GIGANTIC TROWEL

A MOUNTAIN STREAM DAMMED UP BY A LANDSLIDE OUT OF THE HILLS

Excavators are seen in the background working to release the waters which have formed a lake. The water is likely to break through the loess at unexpected places and times.

trade mart of the western half of the province.

The first damage done by earthquake was found to be among the ancient tablets of Hwa Yin Temple, lying under the shadow of sacred Hwa Mountain, not far beyond the Honan border.

In Sianfu, the capital of Shensi, some damage was done to houses, but there was no loss of life. Lesser destruction was wrought in spots between Sianfu and Pingliang.

In the vicinity of Tsingning and Pingliang, five to six thousand feet above sea-level, cave-dwellings in the loess cliffs collapsed, causing great loss of life among the peasants, who principally inhabit this style of home. Cattle, horses, and herds, stabled and folded in caves, were buried alive.

Passing Pingliang, the investigators found themselves in the belt of complete destruction, where cities as well as peasant villages suffered heavy loss of life and all buildings were leveled.

At Wating, where the highway forks, one road going north to Kuyuan and the Mohammedan region along the Yellow River and the other west to Lanchowfu and Turkestan, we obtained our first photographs of a ruined city. Taking the road to the provincial capital (Lanchowfu), we soon ascended Six Plate Mountain. With the elevation, evidence of seismic disturbance grew less, to become again abundant when the loess foothills of the west descent were reached.

IN THE DISTRICT WHERE "THE MOUNTAINS WALKED"

Two of the hardest-hit cities, Lungteh and Tsingning (which, being interpreted, mean, respectively, Virtuous Dragon and—paradoxically—Quiet Peace) were passed, and then we visited the district where "the mountains walked."

Following the Sianfu - Lanchowfu - Turkestan highway, we ascended a small valley of steep grade directly west of Tsingning. Suddenly the highroad for a length of a quarter of a mile dropped out of sight. It had been cut as if chopped off with an axe, leaving the fifty-year old poplars and cottonwoods with which it is lined partly uprooted, like sentinels stricken at their post, upon the edge of the sixty-foot gully which occupied the position of the road.

The roadside water-supply of a near-by village had disappeared down this same gully. The natives were carrying their water from a new lake a mile to the south, in the center of the valley.

Making his way over the rent terraces to this lake, which had been formed by the damming up of the valley stream by a two-mouthed slide from the hills on the opposite bank, Mr. Hall procured what are, perhaps, the three most explanatory illustrations (pages 450 and 460).

THE CLIMAX OF DESOLATION

The short valleys in this section join one another like links in a chain. Riding to the summit of the divide which separated this from the next link, we were amazed by the panorama of a valley filled with the loess dust and clouds of seven tremendous landslips which had come out of the hills on either side. This little nook in the hills, some five miles long, known as the "Teng Clan Draw," had become in verity the climax of desolation.

Hardly enough valley-floor land remained uncovered for one good kitchen garden; several peasant settlements lay buried beneath the debris; one "village of the dead," containing not a single survivor, lay in ruins.

A lone mound of fresh earth—the grave of one of the few victims who have been excavated—stood between the ruins and a thirty-foot precipice cut by the slide which had just missed the village. From a reed stuck in the earth hung a paper strip bearing the inscription: "The Eastern Lord of the Church, if you seek and call, may save your bitterness." The dead was Mohammedan.

THE FIRST SHOCK CAME AT 9:30 IN THE EVENING

The only survivors of this valley were saved as if by miracle—a husbandman and his two young sons, whose farmstead, instead of being buried, was caught upon the back of one of the slides, carried half a mile down the valley to where it was diverted by two streams of earth coming from other directions and, as the resultant of the two forces, was pushed another quarter of a mile up a small draw.

RELIEF WORKERS DIGGING TO RELEASE WATERS BEHIND A QUAKE-MADE DAM

The earthquake made this dam of millions of tons of loose earth, stretching from valley-side to valley-side, in a few seconds of time.

FROM THE TOP OF THE DIVIDE OVERLOOKING THE VALLEY OF DEATH

The terraced hillsides showed seven immense gashes, out of which had poured the loose earth deluging the valley floor and burying farms and villages.

These persons, like all others in the slide zone, were unaware of the nature of the disaster which had overtaken them until the following morning. The earthquake, registered by the fine seismograph of the French fathers of the Sikawei Observatory at Shanghai at 8:09 p. m., December 16, occurred in Kansu between 9:30 and 10 o'clock, sun time, when all persons and animals were housed. A bitter cold wind and dust storm, raging at the time, added to the blackness of the night.

The survivors say that they heard a tremendous underground roar and felt the shock, which seemed to them to consist of a sickening swing to the northeast and a violent jerk back to the southwest, lasting half a minute. They made all ordinary efforts to save themselves, and between successive tremors following the main shock huddled back into the ruins of their homes to await the morning.

Not until day dawned and they crawled out to find neighboring villages obliterated, farm lands carried away or buried, streams blocked, and hills of earth towering above their compounds did they apprehend that the "hills had walked."

It was in this Valley of the Dead that the most arresting freak of the cataclysm occurred. Two sections of the ancient, well-packed highway, accompanied by the tall trees which bordered it, were cut from the line of road following the side hill, swept hundreds of yards over the stream-bed, and set, intact, upon an angle on top of the heap of loose loess.

It took weeks to reëstablish communications over these breakages—to rebuild telegraph lines and pack down trails on which horses would not sink to their bellies and carts to their hubs.

THREE LAKES ARE FORMED

The valley of desolation opened at its western end into a wider, more gradual valley of horseshoe shape, through which we semicircled to the south upon our return to Tsingning.

At the junction of the valleys stands Swen Family Gap, a town of several thousand souls, in which one-tenth were killed by collapse of buildings and cave dwellings; and the other nine-tenths were saved by the miraculous stoppage of two bodies of earth shaken loose from the mother hill and left hanging above the village, lacking only another half-second's tremor to send them down. A third avalanche, having flowed from the hills on the opposite side of the valley across the valley floor and the stream-bed, is piled up in a young mountain near enough to the village to overshadow the wall.

RESCUED GODS OF A RUINED "THREE-DIVINITY" TEMPLE

Airgod and Watergod were excavated unscathed, although the temple was smashed; but Earthgod, significantly, was destroyed. Chinese tenacity and persistence in the face of difficulty are illustrated by this erection of an altar from the broken tile of the destroyed temple.

Our route through this larger valley led us past three lakes formed through the blocking of the stream by five enormous slides.

Some of the scooped-out places left by these slides were half a mile in width at the mouth, extended back into the hills for a mile, and furnished enough dirt to cover several square miles of valley floor. Some were as regular as if they had been made with a gigantic trowel, while others were as ragged as if they had been ripped out of the hills by the teeth of some monster.

In each case the earth which came down bore the appearance of having shaken

loose clod from clod and grain from grain, and then cascaded like water, forming vortices, swirls, and all the convolutions into which a torrent might shape itself.

One of these slides pouring down upon a village had buried every building except one inhabited by the old progenitors of the clan. This lone patriarchal home stood on the outskirts and was half covered.

Hay and grain were mingled and mixed with the earth over a distance of half a mile, showing how the dirt had "worked" in its descent. On the opposite side of this slide a threshing-floor carrying several stacks, and an apricot orchard, had come down intact.

The cattle had been so caught in the slide that their limbs or heads protruded, and these had been cleaned by the packs of dogs which roamed the country. Ridge-poles of dwellings turned to sepulchers showed above the ground.

Two slides causing the lowest of these blockades, coming from the sides of the valley, buried a village of several hundred persons, converted a shapely, high loess butte into a ragged mound, and created several miles of lake out of rich valley farms.

The local authorities, realizing the danger of destructive washouts if these blockades were not opened before the late summer torrents, had, before the arrival of outside relief, made such pitiably insufficient efforts as were at their command toward the release of the dammed-up waters. Their efforts, upon recommendation of the expedition, were incorporated in the work of the relief societies.

WHY THE CHINESE CONSIDER THE CALAMITY A BLESSING

Conditions in a score of small valleys in the Tsingning and Hweining neighborhoods are similar to those in the three here described. There is probably no other area, however, where within a half-circle of twenty miles' diameter one may count seventeen immense landslides.

A hundred miles farther west, near Hweining, a bad slide district exists, and some sixty miles north of Tsingning three bad slides occurred, one of which is responsible for the dramatic incident of the burial of Ma the Benevolent, radical Mohammedan leader, while in a cave-mosque with his retainers for the purpose of consecrating his proposed Jihad against the non-Mohammedan Chinese (see text, page 445).

It is this incident which gives the Chinese cause to rate the earthquake as a blessing, for their experience of fifty years ago taught them that while "Heaven slays its hundreds, the Moslems massacre their ten thousands." The damage done to the Mohammedan settlements is in general more severe than that suffered by the Chinese farther south.

ALL CAVE DWELLINGS COLLAPSED

Leaving the Tsingning area, we traveled many miles north to Kuyuan, the largest of the ruined cities and one-time seat of the imperial resident, beyond which we trekked through the hardest shaken section of all. Here the friable loess gives way to the brittle clay-gravel-alkali bunch-grass country, which was too solid to slide, but which cracked like a porcelain dish hit with an immense weight.

Cave-dwellings without exception gave way, not one mud brick remained upon another. Even city walls collapsed, as in Heh Cheng-tze (Black City) and Haicheng.

Nine-tenths of the people of this district were in mourning when we arrived, and there were many new Moslem graveyards. In one cave-village of eighty inhabitants, sixty were entombed, but half were dug out alive by the remaining twenty.

In another town, Yang Loh-chwang, 80 per cent of the residents perished. The remaining townsmen lacked even the heart to bury the dead animals pulled out of the debris, and at the time of our visit three months later, carcasses of human and animal victims still lay rotting together in the streets.

Such were the scenes of desolation which met our eyes until we emerged suddenly upon the bank of the Yellow River, irrigated and made attractively fecund by the enterprising Mohammedans. Here evidences of the disaster vanished as abruptly as they had appeared at the Kansu border.

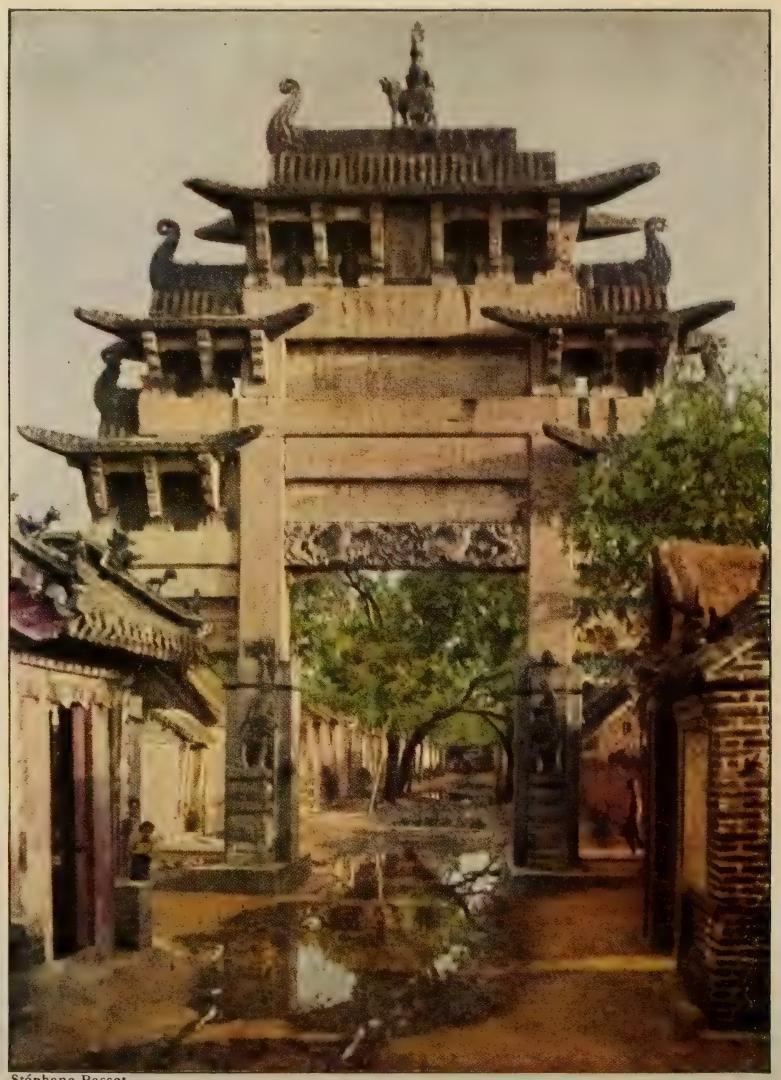
A GENERAL VIEW OF URGA, CAPITAL OF MONGOLIA

Autochromes by M. Stéphane Passet

MONGOLS AWAITING THE ARRIVAL OF A LIVING BUDDHA

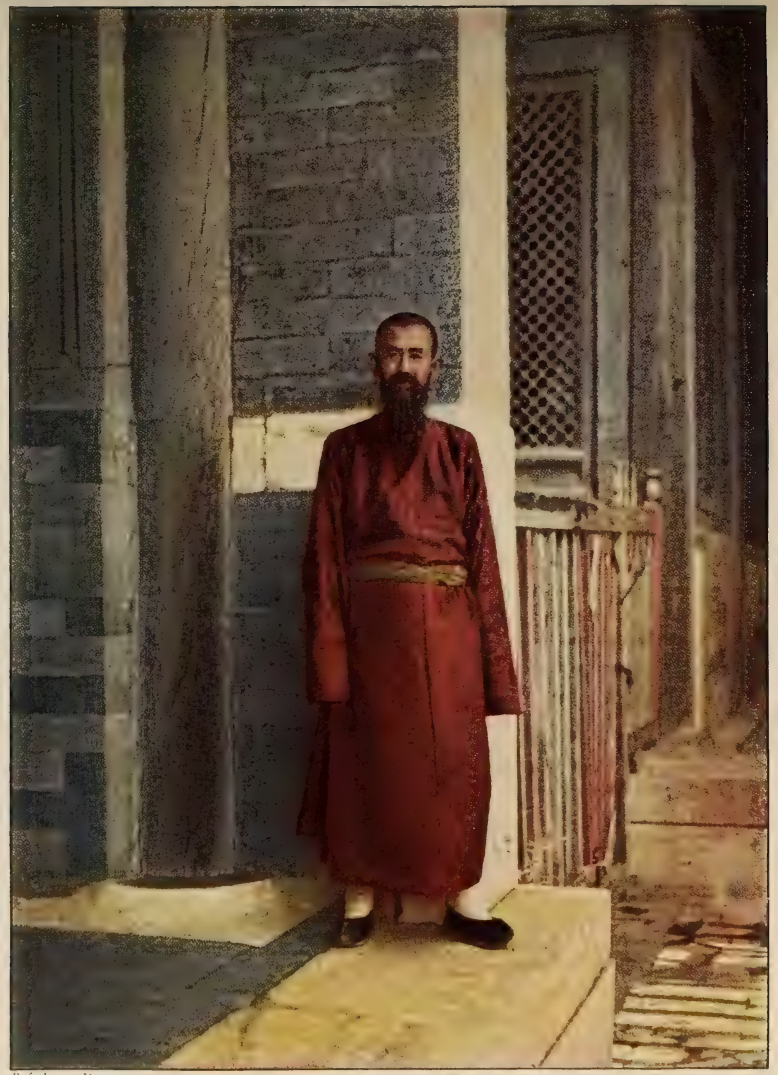
Autochromes by M Stéphane Passet

A LAMA OFFICIAL WEARING A CAPE INTRODUCED INTO MONGOLIA BY FRENCH MISSIONARIES



A GATEWAY OF KÜFU, THE VILLAGE WHERE CHINA'S GREATEST TEACHER, CONFUCIUS, WAS BORN

A MONGOLIAN SHRINE ON THE OUTSKIRTS OF THE CITY OF URGA



A LAMA SERVANT OF URGA, THE HOLY CITY OF THE MONGOLS

Autochromes by M. Stéphane Passet

A JAPANESE FLOWER GARDEN IN PEKING

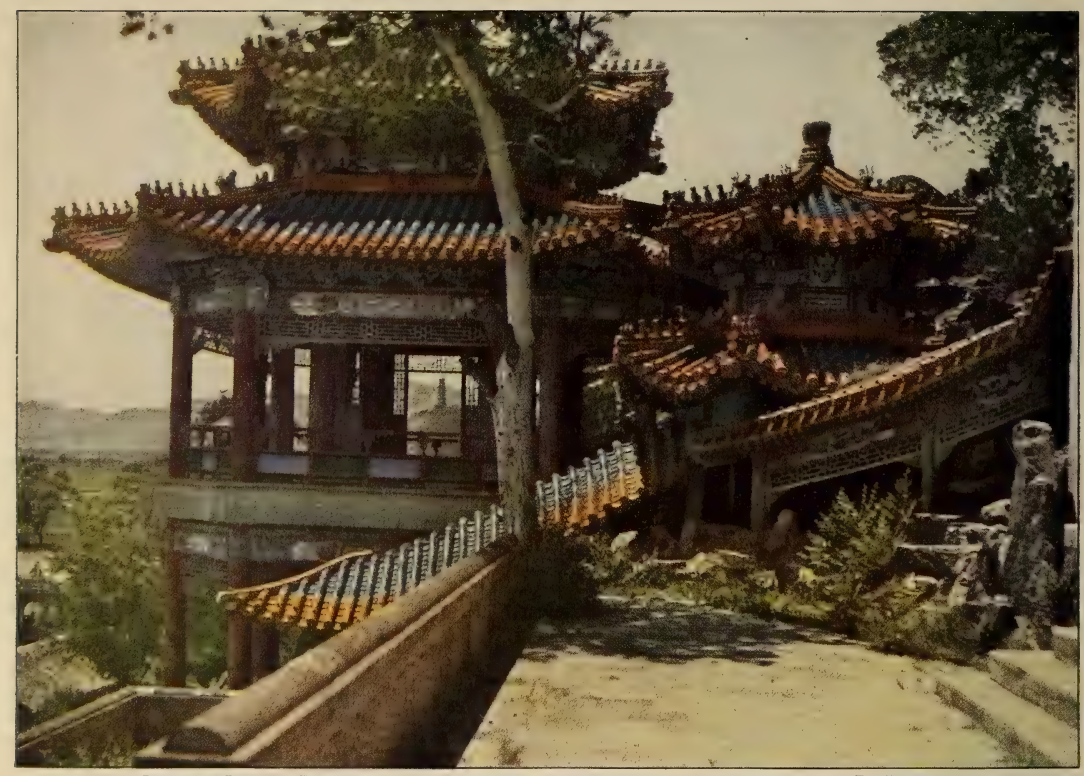
Autochromes by M. Stéphane Passet

GUARDIAN GODS IN THE SUMMER PALACE NEAR PEKING

A KHALKA WOMAN OF NORTHERN MONGOLIA

Autochromes by M. Stéphane Passet

A GRAND LAMA'S MINISTER OF WAR AND HIS STAFF: URGA



THE UPPER PAVILION OF THE SUMMER PALACE NEAR PEKING

Autochromes by M. Stephane Passet

WOMEN OF PEKING, ONE OF WHOM WEARS A MANCHU HEAD-DRESS

A CORNER IN THE CHINESE PARK AT TSINANFU

Autochromes by M. Stephane Passet

THE GATEWAY TO THE HALL OF CLASSICS IN PEKING

A MONGOLIAN WOMAN CONDEMNED TO DIE OF STARVATION

Autochromes by M. Stéphane Passet

A LAMA IN CHAINS IN A MONGOLIAN PRISON

THROUGH THE HEART OF ENGLAND IN A CANADIAN CANOE

By R. J. Evans

WATER has always had a fascination for me, and many of my holidays have been spent camping on the waterways of England. This account deals with my most successful trip. We started from Oxford up the Oxford Canal, which, bearing due north, brought us in safety to Warwick, where we embarked upon the Avon.

Except in the immediate neighborhood of Stratford, this river is little known—a surprising fact when one remembers that for beauty of scenery and historical interest it is second only to the Thames, while, as providing a series of pictures of English country life unspoilt by modern innovations, it is the Thames' superior. The Avon we followed to Tewkesbury, where we entrained to Cricklade and started the second half of our voyage.

The Thames needs little introduction. Within the small compass of about a hundred miles it shows just what is characteristic in English scenery, history, and modern life. The monuments of the past, the placid and prosperous life of the present, the quiet pastoral beauty of meadow, woodland, and silver stream, are seen here, and all at their best.

One is inclined to say that if a visitor had only four days in which to capture a true impression of this country, he would do well to spend two of them in the Thames Valley.

THE EQUIPMENT FOR TWO IN A CANOE

Preparations for the voyage were soon made. There being only two of us to consider, a large Canadian canoe was selected as the easiest craft to work and one which possessed, in addition, the virtues of roominess and portability. A light gypsy tent was carried for camping purposes, and throughout the whole trip no trouble occurred to cast doubt upon the wisdom of our choice.

Leaving Oxford on a sunny August morning, we paddled slowly north to Banbury. The whole of this stretch is rich farming country, marked by that peaceful, settled look so characteristic of the Midlands.

The canal winds quietly through waving poppy-starred wheatfields and low-lying meadows, with the meditative cattle standing knee-deep in the sweet pasturage, while anon a bend carries one past woodlands where the trees meet overhead and form a canopy through which the sun's rays scarcely penetrate.

At intervals one comes to tiny villages, usually clustered round the old gray church, and looking, as they dream in the sunlight, the very embodiment of ease and peace.

More frequently there comes a lock, which affords a welcome break to the pleasure-boat, but which presents a formidable obstacle to commerce.

It is only sixty-five miles from Oxford to Warwick, but there are sixty-three locks, and the time spent in negotiating these is one of the chief reasons why the canals do not prosper. They are small in size, having been designed so that one man can work them, and, admitting only one barge at a time, are wasteful in the extreme, both of time and water.

BANBURY, FAMOUS FOR CAKES AND A NURSERY RHYME

Twenty-seven miles from Oxford is Banbury, famous for its cakes and its nursery rhyme of the Lady upon a White Horse. Nowadays it is a prosperous, sleepy market-town, not particularly well built, but having a few fine half-timbered houses. The Globe Room at the Reindeer Inn once had some remarkable oak paneling, but it has been acquired by an American millionaire and now decorates a mansion in New York.

Four miles farther on is the village of Cropredy, where, on June 29, 1644, a fierce battle was fought between the Royalists under Charles I and the Parliamentarians. The scene of the fight was the old bridge which spans the little river Cherwell, and which still remains much the same as it was on that summer evening 278 years ago, with the church tower

LUNCH NEAR TADPOLE BRIDGE, ON THE RIVER CHERWELL, ABOVE OXFORD

Photographs by R. J. Evans

A SCENE ON THE OXFORD CANAL NEAR LEAMINGTON

Note the low bridge, the narrow footpaths, and especially the width of water under the bridge, where the tow-path goes through.

Drawn by James M. Darley

A SKETCH MAP OF THE CANOEISTS' TRIP THROUGH THE HEART OF ENGLAND

The holiday journey began at Oxford, from which city the route lay northward on the Oxford Canal to Warwick; then in a southerly direction, on the Avon, to Tewkesbury; thence by rail to Cricklade, on the Thames, down which the travelers proceeded to London.

looking down on the triumphant Cavaliers as they pursued their foes along the road to "Puritan" Banbury.

Near Cropredy we met a barge, almost the only one we had seen, though farther north they are more common. They grow fewer in number every year, and this is a great pity, for there are few more picturesque sights than a gaily painted canal-barge, towed quietly along by an old horse, with a small boy in attendance to see that he behaves, and steered by a stout old lady wearing either an old sunbonnet or a man's cap.

Life on board one of these slow-moving canal-barges appears to possess many charms. The barge people pass an amphibious existence, belonging neither to the land nor to the water, but having a human interest in each. The women almost wholly live aboard their floating homes, often never stepping ashore from one day to the other, and going about their domestic duties, as well as those connected with their calling, with all the precision and cheerfulness in the world, as if there were nothing strange or out of the way in their surroundings.

Near Fenny Compton we discovered an old windmill, one of the few of its type remaining. It is built entirely of wood, on a central pivot, so that by means of a long lever the whole structure can be swung round to suit the wind. I was reminded of a somewhat similar mill in Hampshire made from the timbers of the *Shannon*, in which one may still see the scars made by the *Chesapeake's* cannon-shot.

For the next few miles the canal runs in a cutting, and locks are so numerous (23 in 14 miles) as to become a burden; so that it was with relief that we paddled hastily through the outskirts of Leamington and embarked upon the Avon about three-quarters of a mile above Warwick.

The Oxford Canal is typical of its kind and fully illustrates the defects of the English canal system. The canals are

Photograph from Aerofilms, Ltd.

WARWICK CASTLE, THE HOME OF "THE LAST OF THE BARONS"

One of the most beautiful river reaches in England is that on the Avon where it glides slowly past the thickly wooded eminence on which stands the castle of "The King Maker." One needs little imagination to make this battlemented pile remind him of the "days of old, when knights were bold and barons held their sway."

too narrow and too shallow, being rarely more than 30 feet wide and 4 feet deep, while the largest locks are less than 8 feet in width. The locks are too numerous and too cumbrous and slow in operation, and the whole method of horse-barge transport far too slow.

To bring the canals in line with modern requirements would be enormously expensive, and so it is probable that they will remain as they are—the picturesque and extremely interesting survivals of a more leisurely age.

WARWICK, ONE OF ENGLAND'S MOST INTERESTING TOWNS

Warwick is one of the most interesting towns in England, its history going back more than a thousand years, to the foundation of the castle by Ethelfleda, the famous daughter of King Alfred.

The present building dates from the 13th century and is one of the stateliest of England's homes. Rising from the very bank of the Avon, with its great Norman keep towering aloft like a giant sentinel, it presents a picture of dignity and strength which remains long in the memory (see pages 476 and 478).

The town itself is full of medieval associations. In the center of the High Street is the Leycester Hospital and Chapel, where twelve old soldiers pass the evening of their days, living under the rules laid down by their 16th-century founder and forming a striking instance of that continuity of tradition and dislike of change so characteristic of the Midland folk.

The Church of St. Mary has, alas, been "restored," but the wonderful Beauchamp Chapel remains untouched. Built between 1400 and 1500, by the great Beauchamp family, at the height of the Perpendicular period, it is an architectual gem and forms indeed a page of English history in itself (see page 479).

THE CHARM OF ENGLISH PARK-LAND

From Warwick the Avon winds away toward Stratford through the grounds of the castle, and there we realized to the full the extraordinary charm of the English park-land.

The low-lying fields, covered with the lush green grass and dotted with the golden buttercups and snow-white daisies, stretch away on either side, broken by the trees, singly, in clumps, or great masses, which are the glory of the place. Here is a group of oaks which were saplings when the Armada sailed, and there a giant beech raises its clean, velvet-smooth trunk.

Herds of deer move lazily and securely along, while from all around come the calls of innumerable wild-fowl. A noble heron flapping slowly overhead and the great castle in the background complete the picture. It is a very "haunt of ancient peace."

On leaving the park our course became more difficult, and great care was necessary to avoid the shallows and rocks which plentifully bestrewed the river-bed. Fortunately, no mishap occurred, and by nightfall we were safely encamped at Stratford, the home of Shakespeare.

STRATFORD DURING A SHAKESPEARE FESTIVAL

We were lucky enough to arrive during the annual Shakespeare festival and found the town crowded with visitors. Is there any significance in the fact that by far the greater number hailed from America? Certainly, he who wishes to understand the English people and the things which have gone to make them must visit Stratford; and we counted it a happy augury to see the two great branches of the English-speaking peoples meeting here in common homage to the greatest of English-speaking writers.

The whole town and neighborhood is given up to the cult of Shakespeare, and this is as it should be. Shakespeare is England's poet, and Stratford is a typical English town, set in the heart of England.

We first climbed the tower of the Memorial Theater (see page 481) and looked around. The Avon flows gently past the very foot of the building, and close by is crossed by the two ancient bridges, with their many arches, while in the distance is the smiling Midland plain.

The town itself is like many English country towns — quiet, dignified, and peaceful. Shakespeare's house lies in a by-street. With its gables, small diamond-paned windows, and framing of oak beams, it is typical of the 16th-century middle-class house.

Photograph by Charles Reid

SWANS ON THE AVON, BENEATH THE BATTLEMENTS OF WARWICK CASTLE

To sense the glory of the past, one should leave the convenient railways of England and float on the quiet rivers of the land. Such weathering walls of huge, silent castles stand as mute memorials to a rich history, festooned with epoch-making events.

Photograph by R. J. Evans

ALWAYS THE FIRST JOB OF THE DAY, THE OUTDOOR SHAVE

The equipment for this novel 250-mile trip through the most historic region of England consisted of a large Canadian canoe, a gypsy tent, collapsible canvas basin (seen in the illustration), and a few cooking implements.

Photograph from "Topical," © Central Aerophoto Co., Ltd.

KENILWORTH CASTLE, WHICH CROMWELL'S MEN DESTROYED

Founded by Geoffry de Clinton about 1120 and distinguished by its Cæsar's tower, or Norman keep, with walls 16 feet thick, Kenilworth Castle, five miles north of Warwick, lives in romance because of the events enacted there in the days of Queen Elizabeth.

Photograph by R. J. Evans

LEYCESTER HOSPITAL AND CHAPEL, HIGH STREET, WARWICK

The road goes under the chapel through the arch; the hospital is the old building on the right. The chapel entrance is at the far end, up the steps and along the parapet over the arch, under the flying buttresses—a curious idea.

Photograph by Douglas J. McNeille

A STATELY AVENUE OF TREES MARKS THE APPROACH TO THE CHURCH WHERE SHAKESPEARE LIES BURIED

Holy Trinity Church, Stratford-on-Avon, is the foremost literary shrine of the English-speaking world, and no American visitor to Shakespeare's birth-place fails to read the inscription on the gravestone beginning, GOOD FREND FOR IESVS' SAKE FORBEARE.

In the High Street is the old Grammar School where the poet learnt his "little Latin and less Greek," and which still, in its quaint, low-ceilinged rooms, with their heavy oaken beams, carries on the tradition of learning. A little farther on is New Place, where Shakespeare spent his last years, but which is now a garden.

Near by, in a still green close, approached by an avenue of shady limes, is the church where the poet lies buried, surrounded by his kinsfolk (see page 480).

Photograph by R. J. Evans

SHAKESPEARE MEMORIAL THEATER, STRATFORD

Shakespeare's plays are performed here annually during April and August. The statue in front is of the poet. The building is modern, having been erected in 1877.

SHOTTERY, THE HOME OF ANNE HATHAWAY

The next morning we walked over to the little village of Shottery, half buried in the trees, a mile and a half away. Here is the home of Shakespeare's wife, Anne Hathaway. With its half-timbered walls and thatched roof, broken by the deep-set dormer windows and surmounted by sturdy, honest-looking chimneys, it is the perfect cottage (see page 482).

Returning down the High Street, we visited and photographed the Harvard house, home of the founder of Harvard University and a mecca for American pilgrims.

We stayed four days in Stratford and left with regret.

Formerly the Avon was an important waterway, and vessels of forty or fifty tons berthed regularly at the wharves of Stratford, but, as in many other cases, the railway killed its prosperity; and now the river, no longer looked after, is slipping back to its unimproved condition.

Some of the locks and weirs have been partially removed, and shallows, terminating in awkward and sometimes dangerous obstructions, have thus been created. We were frequently hindered also by the weeds and rushes, which in places stretch from bank to bank. Bent on pleasure, as we were, and with plenty of time, these difficulties added to our enjoyment.

The twenty-mile stretch to Evesham is full of interest. There are no towns and few villages. The prevailing impression was one of remoteness, which was added to by the obstacles we had to surmount. It was hard to believe that within a few

Photograph by W. A. Mansell and Co.

ANNE HATHAWAY'S THATCHED-ROOF COTTAGE: STRATFORD-ON-AVON

For more than three centuries the world has speculated upon the love scenes which were enacted in this cottage, where the creator of Romeo and Juliet, of Miranda and Ferdinand, of Beatrice and Benedick, of Bassanio and Portia, of Rosalind and Orlando, won his bride.

miles were manufacturing towns, full of busy people. Here everything betokened peace and the absence of man.

EVESHAM, WHERE SIMON DE MONTFORT FELL

Evesham has a fine position in a loop of the river, and is specially famous for its orchards. Lying in a sheltered district called the "Golden Valley," its fruit rivals that of Kent, and in springtime the miles and miles of pink and white blossoms, filling the air with their fragrance, make a sight not easily forgotten.

Historically it is the scene of the decisive battle in which the great popular leader, Simon de Montfort, the first man to summon a representative Parliament in England, was killed, on August 4, 1265. The victor was Prince Edward, afterward the great warrior-statesman, Edward I, who, as he himself said, learnt much from the career of his rival.

Montfort's words before the battle are immortal. Seeing the Prince's army descending the hill, and so trapping him in the river bend, he turned to his son with the remark, "Let us commend our souls to God, for our bodies are Prince Edward's." So perished a gallant gentleman.

The town itself is disappointing. There are two churches sharing one churchyard; but they have been "restored," and so robbed of much of their interest. Near by is the Bell Tower, a beautiful Perpendicular structure standing quite alone, an unusual feature in England, and forming a landmark for miles around.

CANAL LOCKS PROVE A TRIAL

Below Evesham the river widens, but still keeps its air of quietness. We paddled down reach after reach, all invested with the same spirit of remoteness from man and his doings and all beautiful with the beauty of English meadowland and woods.

The locks, which below Evesham have not been taken away, taxed our ingenuity and patience very highly. At Chadbury, after a specially vigorous struggle, we were told by a contemplative old man, who watched us with great interest and amusement, that that particular lock had not been opened for two years, but that it was much better than the next one, at Fladbury (see page 484).

He was right. Fladbury was our Waterloo. By great efforts we succeeded in shutting the bottom gates and opening one of the sluices; but the lock then refused to fill, owing to the numerous leaks; so that, after all, we were compelled to portage the canoe to a spot nearly half a mile below.

This done, we soon arrived at Pershore, where we spent a few hours exploring the little town, which on the hot summer afternoon seemed wrapped in slumber, before tackling Pershore lock. Fortunately, this was in comparatively good condition, so that we managed to push on to Tewkesbury without much delay.

The last few miles were through monotonous country, though we might have seen more beauty in it if there had not been a strong head wind which taxed our temper and delayed our progress.

WHERE RICHARD CROOKBACK SLEW THE LANCASTRIAN PRINCE

Tewkesbury stands at the junction of the Avon and Severn, and so has always been an important route town. The greatest day in its history was May 4, 1471, when, at Bloody Meadow, between the two rivers, the Yorkist King Edward IV defeated the Lancastrians under Queen Margaret and her son Edward, both of whom were captured.

Tradition points out the spot on the old Avon bridge near by on which Richard Crookback, brother of the king, slew the Lancastrian prince in cold blood after the battle.

The town itself has many interesting old houses, including the Hop Pole Inn, at which Mr. Pickwick dined on his memorable journey from Bristol to Birmingham, in company with Mr. Ben Allen and Mr. Bob Sawyer.

The old Norman Abbey Church is one of the stateliest buildings in the West Country, and contains the tombs of many great men, including that of George, Duke of Clarence, who, condemned to death for high treason, was allowed to choose the form his end should take, and, in accordance with his choice, was drowned in a butt of malmsey wine—or so tradition says.

FLADBURY LOCK, ON THE AVON, TYPICAL OF THE LITTLE USED WATERWAY

This lock would not fill, so the author and his companion had to portage their canoe nearly three-quarters of a mile. Note the bushes growing out of the gate itself.

Photographs by R. J. Evans

FLEET INN, ON THE AVON NEAR TEWKESBURY

Notice the ferry, with its gates at either end to prevent animals breaking overboard if alarmed. Edward, Prince of Wales, slain by the Yorkists in 1471, is buried in the magnificent abbey church near by, one of the finest specimens of early Norman architecture in England.

THE THAMES ABOVE LECHLADE, NEGLECTED DURING THE WORLD WAR

In many places the weeds are so thick as to make progress in a canoe almost impossible (see text, page 486).

Photographs by R. J. Evans

DESCENDING HARRINGTON WEIR

Formerly there was a lock here, but it has been taken out and only the sill remains, over which the canoe has to be carefully lowered. Note the pavement in the foreground. The place is now used as a ford.

Photograph by R. J. Evans

THE MARKET PLACE IN LECHLADE

The church was a great favorite of the poet Shelley, who wrote a poem about its spire. The wide street and houses of stone are characteristic of the district.

At Tewkesbury we left the water and journeyed by train to Cricklade, a little town some seven miles from the source of the Thames.

At Cricklade the river is little more than a rivulet—in fact, the local people all referred to it as "the Brook," and that the name was well deserved we found from personal experience.

The first eleven miles to Lechlade is not really navigable water, and for most of the distance we had to walk in the bed of the stream, guiding the canoe over the shallows, which occurred every few yards, while if there were sufficient depth of water our progress was impeded by the heavy weeds, which, thanks to enforced neglect during the war, were a formidable obstacle.

At Lechlade the river becomes navigable, though from here to Oxford traffic is scanty, and it is rare to see anything larger than a rowboat (see page 485).

The river winds its narrow, tortuous course between long, level meadows or rushy banks. Black and dun cattle wading in the shallows; an old bridge or a comfortable riverside inn haunted by anglers, for the river here is full of fish; a heron winging his slow way home—these are the most exciting scenes in a day's paddle. But though this country is not on the grand scale, it has a quiet beauty all its own, which is remembered when more spectacular places are forgotten.

IN LECHLADE, WHOSE CHURCH SPIRE SHELLEY MADE FAMOUS

Lechlade is a Cotswold town, built round the wide and sunny market-place, from one side of which rises the 16th-century church, with its spire so loved by the poet Shelley (see page 486). The houses are of stone, brick being a rarity in the Cotswolds, and have an air of mingled spaciousness and dignity which is most attractive.

A steady, uneventful paddle of fifteen miles brought us to Newbridge, which, like New College at Oxford and the New Forest, is of great antiquity, being in fact the oldest bridge on the river.

On the bank is the old inn bearing the quaint sign of "The Rose Revived." Its

Photograph by R. J. Evans

THE FERRY AT BABLOCKHYTHE HAS ITS PLACE IN ENGLISH POETRY

This picturesque spot is mentioned in Matthew Arnold's "Gipsy Scholar." Note the rope by which the ferry is operated.

sign-board was painted by Sir Hamo Thorneycroft, and represents a rose in a glass of beer, in which liquid it appears to be flourishing greatly. Over the sign-board is a small penthouse to act as a defense against the weather.

PASSING THE SCENE OF THE "KENILWORTH" TRAGEDY

Four miles below is the ferry (see above) where Matthew Arnold saw the Scholar-Gipsy "crossing the stripling Thames at Bablockhythe," and about a mile on the right the village of Cumnor, where was enacted the tragedy of Amy Robsart, described by Sir Walter Scott in "Kenilworth."

At this point we could see Oxford, but as the river describes a great horseshoe curve, it was some time before we approached the outskirts of the city. The sordid nature of the last two miles, covered with railways, warehouses, and gasometers, is only equaled by the memory of its departed glories.

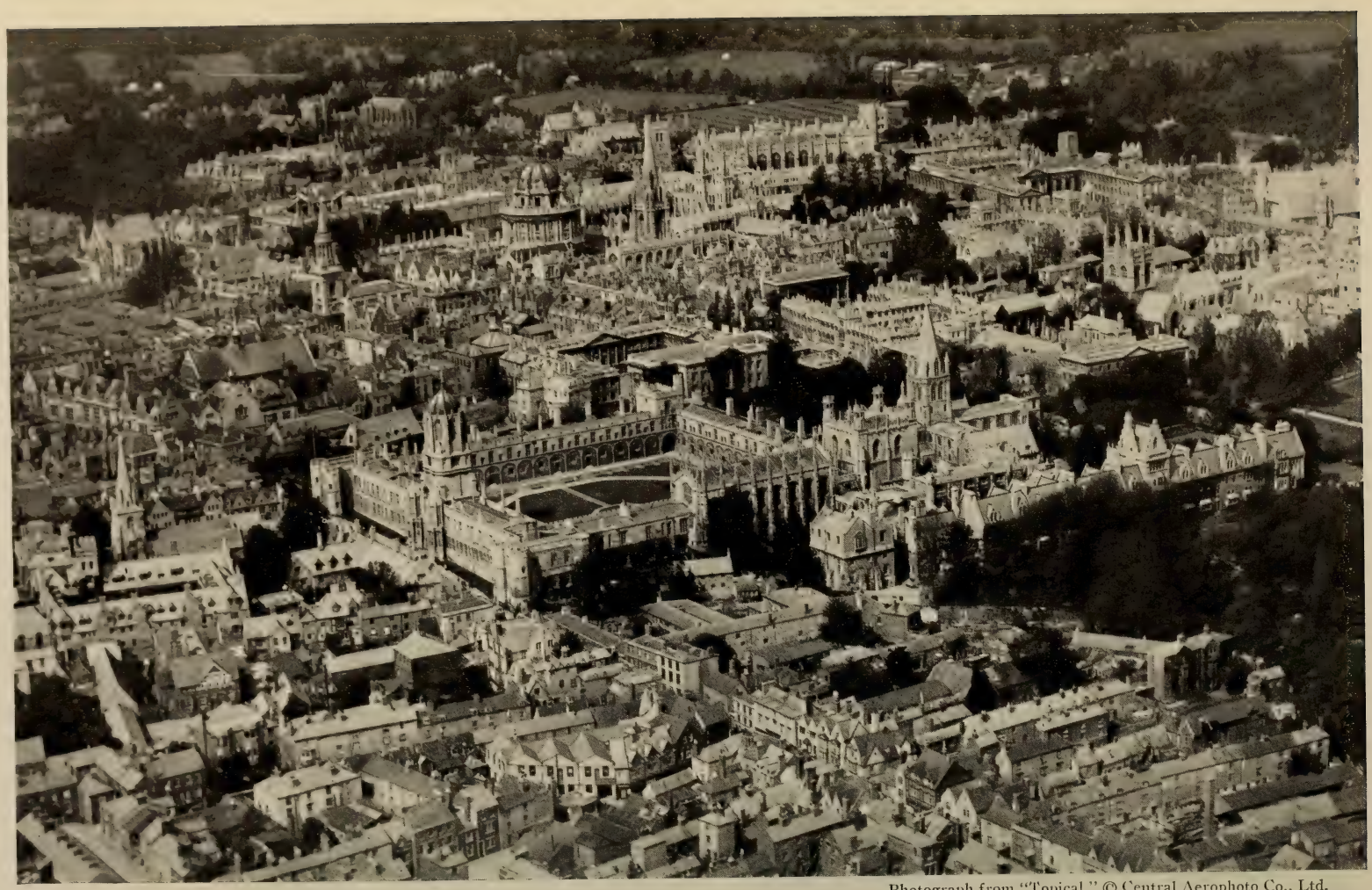
On the left, where now is a cemetery, stood the great Abbey of Osney, and just below the old keep of Oxford Castle rears its hoary head from among the hideous litter and lumber of a gas-works and a railway; yet it was the scene of one of the most romantic adventures of the Middle Ages.

In the year 1142 King Stephen was besieging the castle, in which was his rival, Matilda. A frost set in, followed by a heavy snowstorm, and the case of the garrison was desperate. But Matilda was a true Plantagenet. With four chosen knights, dressed all in white, she stole out of a little postern gate, and under cover of darkness fled across the frozen river and over the snows to Abingdon, seven long miles away, where help awaited her.

A little farther on the river divides and passes under the old Grand Pont, or Folly Bridge, the center of Oxford's aquatic life.

OXFORD A TOWN THAT BELONGS TO THE WORLD

Oxford is one of those towns which, like Rome, Prague, and a few others, are



Photograph from "Topical," © Central Aerophoto Co., Ltd.

OXFORD, WHERE DOMES AND TOWERS BESPEAK THE POWER OF THOUGHT

In the center of the picture is the Tom Quad, surrounded by the buildings of Christ Church College, with the cathedral to the right. In the distance is New College, one of the oldest buildings in Oxford. The dome of the Radcliffe Camera, which formerly housed the library, is a favorite place for a view of the maze of buildings which education has erected in England's most famous university town.

Photograph from "Topical," © Central Aerophoto Co., Ltd.

HENLEY-ON-THAMES ON REGATTA DAY

Henley is an unimportant market town, beautifully situated at the foot of the Chiltern Hills, and has a famous grammar school more than three centuries old. It is becoming a fashionable summer resort, but its main claim to fame is that it has taken "regatta," which once applied to gondola races in Venice, and made it its own; so that boating men the world over think of a small English town, rather than the Queen City of the Adriatic, when the word is mentioned. The famous rowing event takes place early in July of each year (see text, page 495).

Photograph by R. J. Evans

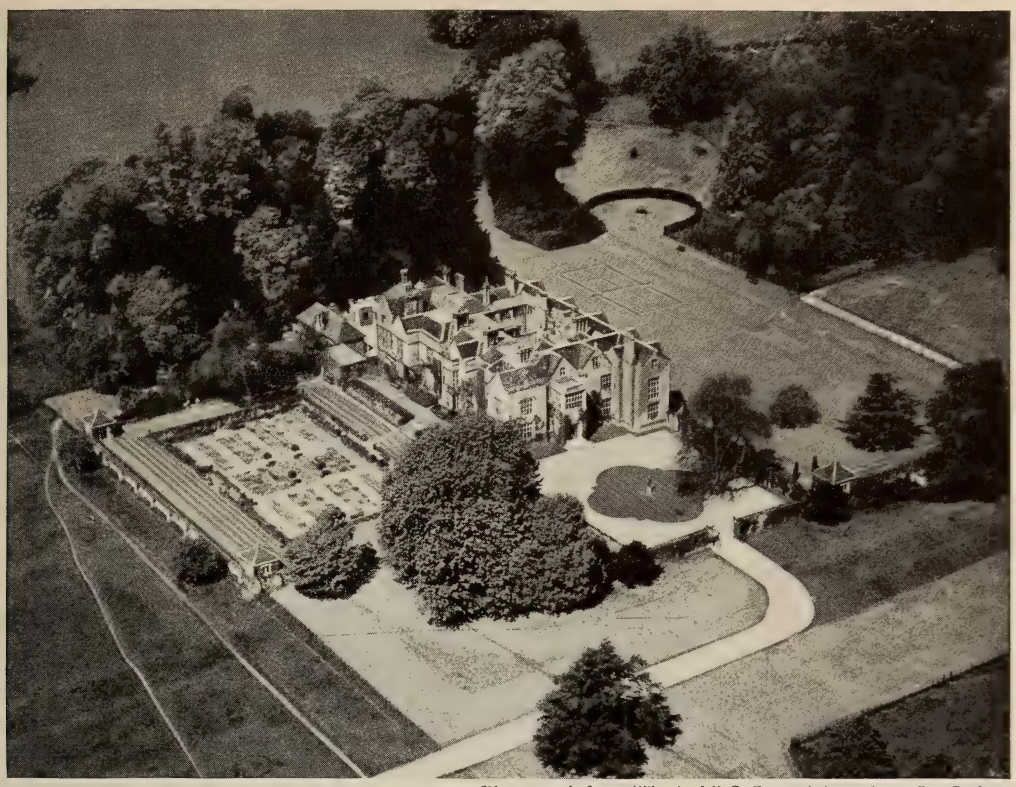
PANGBOURNE, A TYPICAL THAMES-SIDE PLEASURE RESORT

The photograph was taken from the lock to which the white posts guide the voyagers at night.

Photograph by Judges, Ltd., courtesy of C. A. Tinker

A QUIET STRETCH OF THE THAMES AT ABINGDON

The most charming section of the Thames lies between Oxford and Windsor. Here the placid waters reflect the fine Early English tower of the Church of St. Helen.



Photograph from "Topical," © Central Aerophoto Co., Ltd.

WHERE PREMIER LLOYD GEORGE SPENDS HIS WEEK-ENDS

An airplane view of "Chequers' Court," Buckinghamshire, in the heart of England.

really the property of the world, rather than of a single nation. It is impossible in so short an article to give more than a cursory glance at its many beauties. It should be remembered that, with Cambridge, it is the only example remaining of a university with a tradition of communal living in colleges, independent of the university organization, which goes back hundreds of years (see page 488).

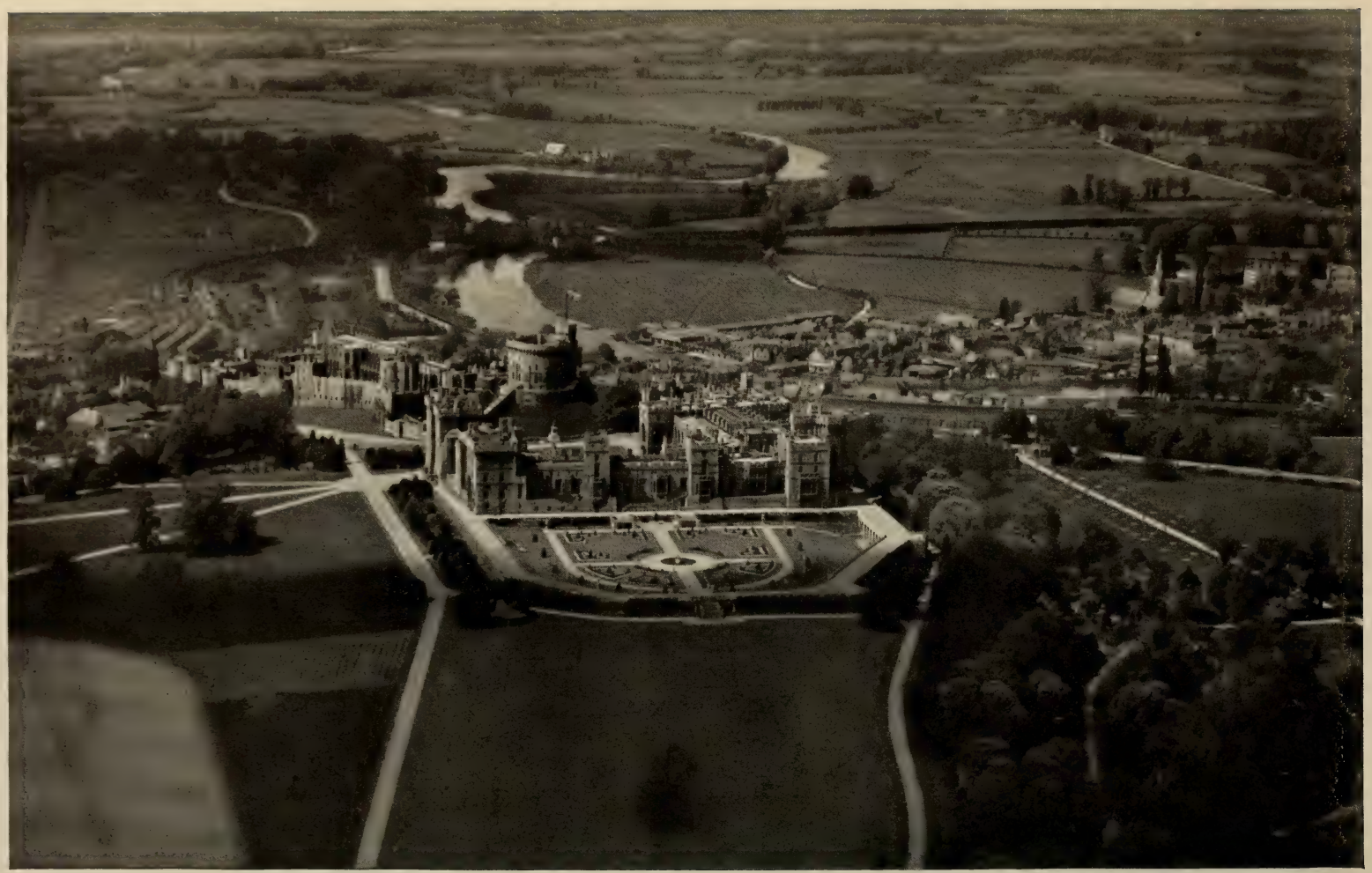
The city is a living link with whatever is or has been best in English life through the ages, and forms in itself an epitome of English social and national history.

Even the most hurried glance at the portraits lining the college dining halls will show the truth of this statement. From Wycliffe and Wolsey to Cecil Rhodes, there is an unbroken line of philosophers and poets, warriors and statesmen. Small wonder that Lord Macaulay picked out the High Street of Oxford and the Close at Salisbury as the two places in Britain through which a Briton would most hate to see enemy soldiers marching.

The "High" is a noble street, some say the noblest in the world. And Oxford has much to offer which is little inferior.

There is the view from Carfax down St. Aldates to the tower of Christ Church, where Great Tom still strikes, at 9 p. m., his 101 strokes, the number of undergraduates, as ordained by the founder of the original college, Cardinal Wolsey. Or climb the Radcliffe Camera and look at the city lying outspread, with the noble tower of Magdalen away in the distance.

Every college has some peculiar attraction and tradition of its own—the library at Merton, with its chained books; the old city walls in New College garden; the chapel of Christ Church, which is also a cathedral—a unique distinction; the sun-dial at Oriel. The list is endless and months might be spent exploring and



Photograph from "Topical," © Central Aerophoto Co., Ltd.

WINDSOR CASTLE, QUEEN VICTORIA'S FAVORITE HOME BESIDE THE THAMES

Purchased by William the Conqueror from the monks of Westminster Abbey, the site on which Windsor Castle now stands has been built upon by many successive rulers. From the Round Tower, which was used as a prison until 1660, there is a wonderful view of the well-ordered countryside, with Eton College just across the Thames. This view shows the Private Apartments as seen across the East Terrace Garden from the air.

appreciating the stored riches of the ages. In this bustling 20th century it is a relief to come to the gray old city and rest awhile among its dreaming spires.

WHERE OXFORD'S BUMPING RACES ARE HELD

From Oxford the river runs to Iffley, a little village two miles below. This stretch is the scene of the College bumping races—the Torpids in the Lent term and the Eights in the summer term. Both are eight-oared races, extending over a week, the boats starting in a line-ahead formation, 150 feet apart.

In both sets of races the principle is that each boat endeavors to overtake and touch the one in front, and if successful takes its place on the succeeding day. Few sights are more beautiful than this—the crowd of undergraduates running on the tow-path, the long string of racing boats, and the line of boats and barges crowded with bright blazers and pretty dresses.

Iffley Mill is probably the most photographed place on the Thames; and, with its mellow red roof guarded by the tall poplars, it is worth picturing.

Two miles below is Sandford, where from time immemorial the King's Arms has been the goal of undergraduate boating parties. Getting through Sandford lock, we paddled on to Abingdon past the Nuneham woods, which in places here come down to the water's edge. Unfortunately, for most of the distance the banks are too high for a small boat to command an extensive view.

Abingdon has fallen from its high estate. In bygone days the abbots of Abingdon dominated the whole district; but their monastery vanished at the Reformation, and not even the site of it is now known.

We found little in the town to detain us, and, paddling down a fine sailing reach, turned down a backwater to the little village of Sutton Courtenay, consisting of a long row of old English cottages, a village green, and a fine avenue of trees—a perfect specimen of the small hamlets which sleep by the banks of Father Thames.

A mile below we reached Clifton Hampden and pitched our camp in the gardens of the "Barley Mow," an old thatched inn and one of the quaintest on the river. Its low-pitched roof, beamed walls, and latticed windows give it a really story-book appearance, and inside the impression of unreality is intensified.

Leaving Clifton Hampden after a good night's rest, we soon reached Day's Lock, sheltered by the twin hills of Sinodun, each with a group of trees at the top, known locally as Wittenham Clumps, one of the best-known landmarks for miles around.

A mile away on the left is Dorchester, another instance of fallen greatness. In the seventh century it was the scene of the baptism of Cynegil, the first West Saxon king to become a Christian, and in the tenth century it was the see of an enormous diocese which stretched to the Humber. In later years the Austin friars built a great priory here, of which the abbey church remains as one of the chief glories of the river. Dorchester has vanished from history for 800 years, but it remains a village of singular peace and charm.

The next few miles are somewhat lacking in interest. We paddled quietly on through Shillingford; Wallingford, a great strategic point in the Middle Ages, but now a sleepy and uninteresting town; under the Great Western Railway bridge at Moulsford, and then down a straight two-mile reach on which the Oxford University trials are rowed before the Eight to row against Cambridge are selected.

Half-way down the reach is the Beetle and Wedge Inn, an old hostelry rebuilt about fifteen years ago and having its unusual sign prominently displayed.

THE MOST BEAUTIFUL SPOT ON THE THAMES AT GORING AND STREATLEY

A mile below are the twin villages of Goring and Streatley. They occupy what was the most beautiful spot on the Thames, but now, alas, are crowded with the houses of the newly rich; and what was a paradise is now an inferno of money and motor-cars. The country round is still unspoilt and the reaches down to Pangbourne full of beauty.

Pangbourne is suffering the same fate as Goring and Streatley, but we got an effective photograph at the lock before paddling on to Reading, four miles below.

Photograph from Aerofilms, Ltd.

ETON, THE MOST FAMOUS OF THE ANCIENT PUBLIC SCHOOLS OF ENGLAND

Half-way down this stretch we passed the famous Hardwick house. Lying well back from the river, at the end of a magnificent avenue of oaks and cedars, it is one of the oldest houses in the country. Parts of it date from the 14th century, but the main building is Tudor. Queen Elizabeth stayed here and Charles I spent many hours on the old bowling green in front of the house.

READING, FAMOUS FOR ITS BISCUIT FACTORY

We did not stay long in Reading. It is obviously a creation of the railway rather than the river, and by becoming in size and wealth the first town on the river above London, it has lost the charm it once possessed.

A busy, dirty town, it is famous the world over as the seat of Messrs. Huntley & Palmer's biscuit factory and Messrs. Sutton & Sons' seed gardens; but to one who loves the Thames it is a depressing place. We hurried through it and paddled away past Sonning to Shiplake, where we camped on the long island by the lock, getting up early the next morning and reaching Henley in good time.

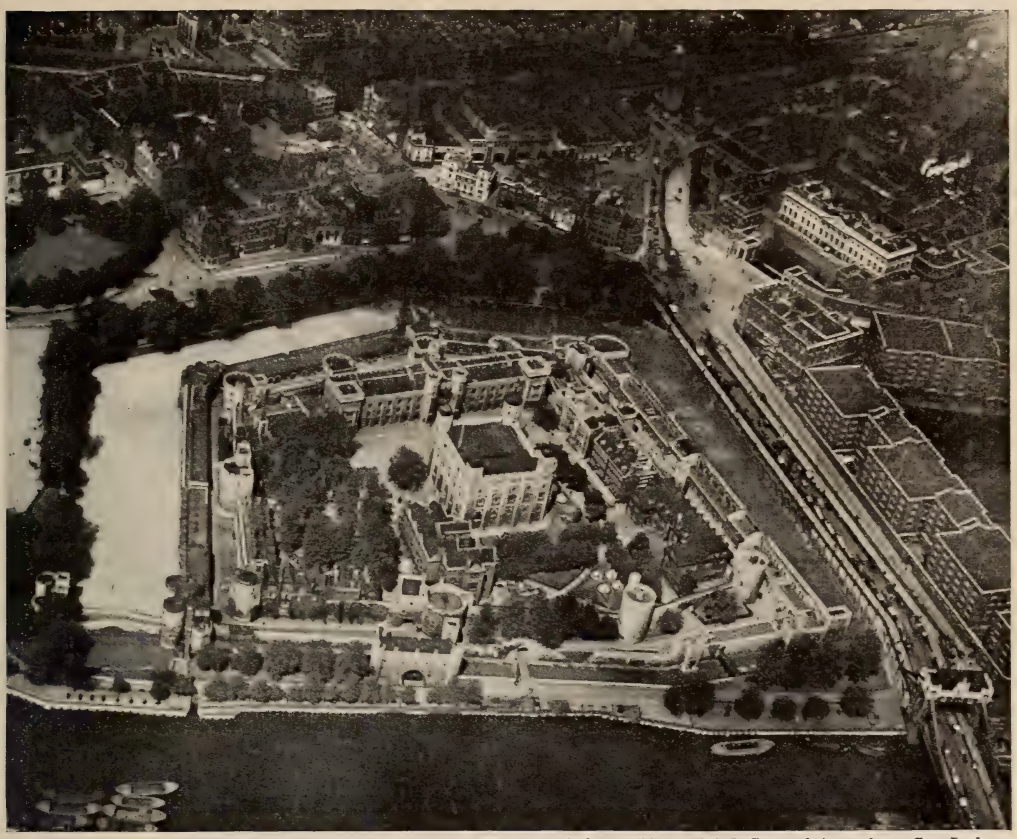
Henley is a quiet little place for fifty-one weeks in the year; but for one crowded week in July it is the scene of the first river regatta in the world, and here once again we have a typical picture of English life.

From the bridge there is a clear view of the course almost down to the starting point. The course is kept clear by white booms and posts, and along these on either side are the boats and punts of the spectators, often twelve or fifteen rows deep (see page 489).

To the left runs a series of club lawns, chief of which is the famous Phyllis Court Club, gay with trees, flowers, flannels, blazers, and dresses. On the right is the tow-path, hidden beneath the crowd who press down to the water's edge.

The whole scene is a glorious riot of color, health, and sunshine, while in the middle is the cool green water, broken only by the racing boats coming swiftly up the straight, accompanied by an ever-growing roar from the partisans on either side.

To be a member of the crew which wins the Grand Challenge Cup at Henley is every oarsman's ambition and is a feat



Photograph from "Topical," © Central Aerophoto Co., Ltd.

SEEING THE TOWER OF LONDON FROM THE AIR, WITHOUT BY-YOUR-LEAVE OF THE BEEF-EATERS

In the center is the White Tower, with its treasured instruments of torture and old armor and the prison of Sir Walter Raleigh. Beneath St. Thomas's Tower, beside the Thames (in the foreground), is the famous Traitors' Gate, through which prisoners of high rank were led to their confinement. Just behind this is the Wakefield Tower, in which the Crown jewels are kept. The wardens of the Tower (the Beef-eaters) still wear the costumes of the Tudor period and form, together with the Life Guards of Whitehall, the most interesting living sights of London.

which entitles him to a place among the immortals.

HOME OF A NOTORIOUS EIGHTEENTH CENTURY CLUB

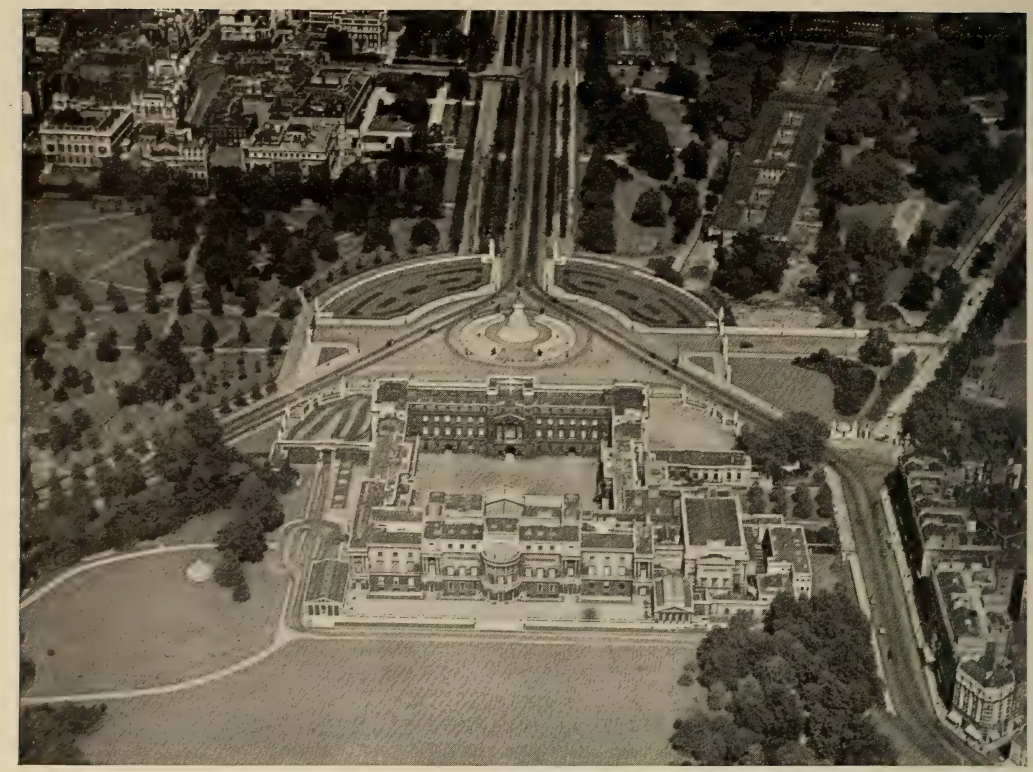
At other times the course is only a long open reach, down which we made good progress past Remenham, and through Hambledon Lock, until we came to Medmenham and its ruined Abbey. Originally a Cistercean foundation, it was dissolved at the Reformation; but two centuries later it acquired a new lease of life.

Sir Francis Dashwood, a leading exquisite of the eighteenth century, made the Abbey the headquarters of his "Society of the Monks of St. Francis," or the Hell Fire Club, as it was called.

Local tradition still tells how on the nights of club meetings the villagers locked their doors, turned out the lights, and sat quaking for fear they should attract the attention of the "monks." No greater contrast than the life of these irreverent jesters and their grim predecessors, the Cistercians, bound by a vow of silence, can well be imagined.

BISHAM, HOME OF ANNE, PRISON OF ELIZABETH

A little lower is Bisham, a place with a most eventful history. Originally a preceptory of the Knights Templar, it be-



Photograph from "Topical," © Central Aerophoto Co., Ltd.

BUCKINGHAM PALACE, THE LONDON RESIDENCE OF ENGLAND'S KING

Beyond the palace is the fine Victoria Memorial, at the head of The Mall. To the right is the upper end of St. James's Park, with Birdcage Walk at the extreme right. A part of St. James's Palace is seen at the left, beyond a corner of Green Park. Grosvenor Place and fashionable Belgravia are directly below the point from which this airplane photograph was made.

came a priory of the Augustinians, and at the Dissolution passed into the hands of Henry VIII, who gave it to his divorced wife, Anne of Cleves. Her marriage is one of the ironies of history. Henry's minister, Cromwell, arranged it for his own ends, assuring Henry that the lady's looks were universally admired. The King later described her as "a great Flanders mare," and the difference of opinion proved fatal.

An eye-witness at their first meeting said that Henry "was marvelously astonished and abashed," scarcely spoke, and forgot to give her the present he had brought. However, he married her; but Cromwell was soon disgraced and a divorce was arranged. Later, Bisham served as a prison for Queen Elizabeth during the stormy days of her sister Mary, and it finally passed into the hands of the Vansittart family, who still own it. In the church close by lies Warwick, the Kingmaker, brought hither after his death at Barnet in 1471: also Salisbury, who did good service at Poitiers.

The Thames now changes its character. The scenery is still very beautiful, but much of the historic interest has gone, and the towns are now pleasure resorts of modern growth rather than romantic or interesting reminders of the past.

We hurried over this final stage of our voyage. Instead of fields and open parkland, the river is lined with trim lawns, decked with flowers and smart houses, while pleasure craft of every description, from steamboats and electric launches to humble canoes and punts, are more than plentiful.

Past Marlow and Bourne End, with its wide sailing reach, we paddled quickly, and then drifted slowly down past the glorious Cliveden woods, which would be

Photograph by Maynard Owen Williams

AT THE FEET OF THE SPHINX BESIDE THE THAMES

The British workman reading his newspaper is oblivious of the centuries which look down upon him in the form of Cleopatra's Needle, brought to London from Heliopolis. This is one of the two bronze sphinxes at the base of the famous obelisk presented to the British Government by Mohammed Ali.

the most beautiful reach on the river were it not for man and his works. At the end is Boulter's Lock, the most fashionable, and so the most artificial, spot on the Thames. Its appearance on Ascot Sunday has been the subject of innumerable paintings and photographs.

"THE MOST REGAL BUILDING IN THE WORLD"

Below is Maidenhead, now little more than a week-end residence for wealthy Londoners, and a mile or so farther we get our first view of Windsor Castle, under the shadow of which we moored our canoe a few hours later—our voyage ended.

Windsor was a fitting goal. The castle is, perhaps, the most regal building in the world. Founded by William the Conqueror, it has always been a favorite royal residence, and to do justice to a tithe of its interests would demand a volume, and that a large one, in itself (see page 492).

Nestling under its shadow is the little town, and a few fields away Eton College, the most famous school in England (see page 494).

Here we bade farewell to Father Thames, after a journey of 250 miles through the heart of England, which had shown us more variety of interests—quaint, beautiful, and historic—than can be shown by any other area in a land full of beauty and possessing a noble history of nearly two thousand years.

Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your July number, the Society should be notified of your new address not later than June first.*

Photograph by U. S. Air Service

NEW YORK'S SKYSCRAPERS AS SEEN FROM THE SKY

The starting point for the United States Army Air Service trail-blazing flight of 4,500 miles to Nome, Alaska (see text on opposite page).

THE FIRST ALASKAN AIR EXPEDITION

By Captain St. Clair Streett, U. S. A. S., Flight Commander

MARCO POLO and De Soto must have enjoyed the same mingling of eagerness and apprehension that moved the four aviators designated by the United States Army Air Service to blaze the pioneer air trail from the nation's capital to its furthermost possession at the northeast end of the continent.

Like the pioneers who drove their prairie schooners in '49 westward across unmeasured distances and through the constant perils of ambushed enemies, so did we, in our pioneer flight to Alaska, come to look upon every forbidding stretch of landscape we passed as an ambush of danger, active or passive, depending solely upon the fidelity and dependability of our Liberty motors to carry us over and beyond.

A spirit of romance and adventure dominated the individual pilots who participated with me in that flight; but beyond the strict military reason which occasioned this expedition, a more fundamental purpose existed in the minds of the aviators. Put into words, it was this:

"Yesterday a month was required to reach the Yukon; if our expedition succeeds, it will prove that the Yukon is but three days distant—by airplane!"

A FLIGHT WITHOUT PARALLEL

Our airplanes were the well-known army De Havilands, similar to those we used in the war. They were equipped with the 400 horsepower Liberty motor, capable of propelling us through the air at the rate of 115 miles per hour.

Each of us carried in the rear seat a tried and true mechanic, for we knew that we were undertaking a flight without parallel in the short annals of aviation. Reaching Alaska depended upon our ability to make our own repairs en route.

Nome lay 4,500 miles away, over rough and uncharted country, beyond the Great Divide of the Canadian Rockies. Fogs and storms would be encountered; landing fields must be located; engines and planes must be kept in the pink of condition, to avoid letting us down into some mountainous region far distant from the haunts of men.

The consent of the Canadian Government to fly over its territory had been cordially granted. Study of the government maps, consultations with the weather bureaus, and reports from the cities and towns along the proposed route followed.

It was determined to lay a course westward from New York to Erie, Pennsylvania; thence over Grand Rapids, Winona, and Minneapolis, west to Fargo and Portal, North Dakota. From this point we would be able to take the plunge into Canada over the fertile wheat belt of Saskatchewan to Edmonton and Jasper, in Alberta.

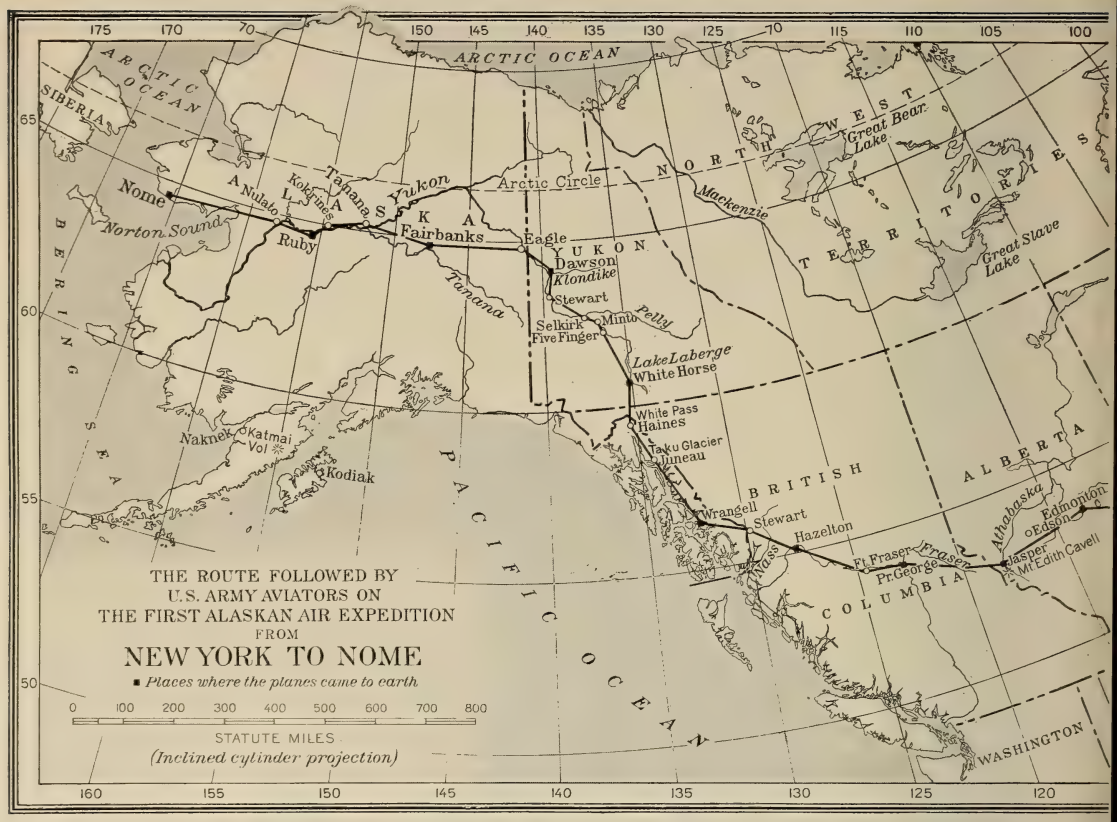
Then would come the fearful jump over the Great Divide, which, if successful, would lead us over the towns of Wrangell, White Horse, Dawson, and Fairbanks to the Yukon River and Nome (see map, pages 500-501).

THE START

On July 15, 1920, at midday, we stood at attention before our airplanes on Mitchel Field, New York, and received the parting instructions of General William Mitchell, our motors slowly turning over and our machines packed and ready for flight. My machine was Number 1, with Sergeant Edmund Henriques as mechanic; Lieutenant Clifford C. Nutt, with Lieutenant Erik H. Nelson as navigating and engineering officer, had Number 2; Lieutenant C. E. Crumrine, with Sergeant James D. Long as mechanic, flew Number 3, and Lieutenant Ross C. Kirkpatrick, with Master Sergeant Joseph E. English as mechanic, Number 4.

Precisely at thirty-three minutes after the noon hour our little flight taxied across the field and took off. The four motors were functioning beautifully as we climbed to 1,500 feet, circling the field and getting into formation. Turning westward, with spirits high, we set a course of 298 degrees on our compasses.

Motoring through limitless skies should be regarded as a boon to humanity, a gift from science, annihilating time and distance, I thought to myself, as we roared swiftly along toward our first night's stop at Erie.



A SKETCH MAP SHOWING THE ROUTE AND LANDING FIELDS OF THE FIRST AIR EXPEDITION

Stupendous as seemed the long journey before us, it amounted in fact only to a succession of hops from place to place. What could be more delightful than a midsummer's excursion like this! Nome and the Yukon gold fields seemed almost in sight.

I was awakened abruptly from my reverie by an ugly vision ahead. Above the palisades of the Hudson a black wall of fog and rain intercepted our path. The pilots behind me spread apart to avoid collisions, as we entered the thick atmosphere.

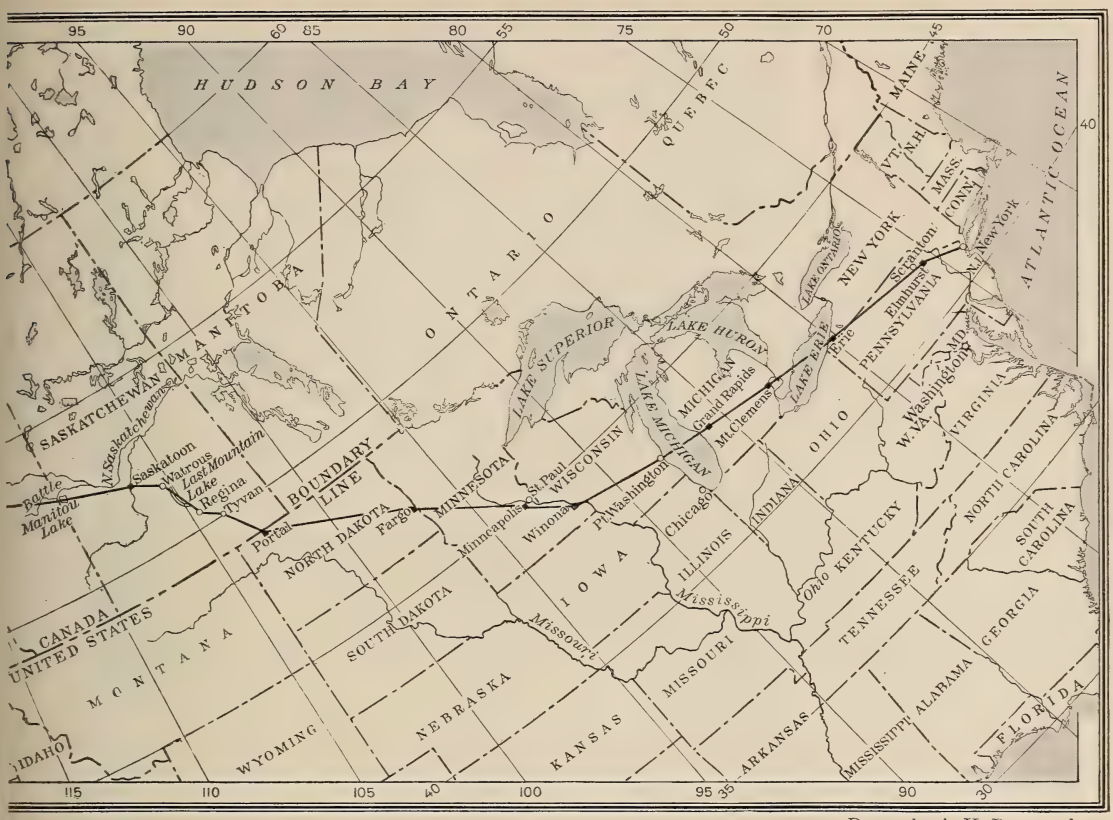
The rain clouds hung 1,500 feet above the earth. I climbed up to get above them, while the others continued steadily ahead into the rain. Ten minutes after we had left Mitchel Field I saw the last of my companions for the time being.

For an hour and twenty minutes I flew through the most bitter rain-storm I have ever encountered. I climbed to 9,000 feet and still there was no top to the storm. Hail-stones smote me at that high, cold level, at the speed of one hundred miles an hour. Knowing this barrage would splinter the propeller, strip the wings, and seriously injure the machine, I cut off the motor and dropped down below the clouds in search of a suitable landing place on which to wait out the storm. As the earth came into view below the clouds, I recognized the country and found I was just south of Scranton, Pennsylvania.

Farther along I noted a field yet untouched by the storm. It was near Elmhurst, Pennsylvania, and I determined to land.

SMASHING AN AXLE

Five minutes later my machine settled down into the hayfield of Mr. Benny Troop, sunk deep into the luxuriant grass, and struck a hidden ditch. The axle of my landing gear snapped and the machine



Drawn by A. H. Bumstead

FROM NEW YORK TO ALASKA, COMPLETED IN 53 HOURS AND 30 MINUTES FLYING TIME

slid along in the tall grass for fifty feet, luckily stopping without turning over. What appeared to be a beautiful, smooth landing field from above proved to be a rough, plowed, and bumpy surface, covered with the smoothest growth of hay imaginable!

Nome was still but a fraction under 4,500 miles away, and here in Mr. Troop's deceitful hayfield my mechanic and I sat regarding the broken axle in the pouring rain! Machines 2, 3, and 4 might be marooned in other fields or might be nearing the city of Erie. I had no way of learning of their whereabouts until they communicated with me.

There was nothing for it but to replace the broken axle and get away again as soon as possible. I telegraphed back to Mitchel Field for an axle. It was delivered the following morning, and after three hours' work we had it installed and were ready to take off.

A runway had been cut across the hayfield to permit us a passageway out. But the gasoline and oil I had ordered from the nearest town had not arrived. Upon investigation we discovered that the fuel truck was stalled in the mud of a country road not far from us.

All hands were called to the rescue, and after several hours' work we disinterred the truck, escorted it to the hayfield, and filled the airplane's tanks. Darkness was falling. It was necessary to lay over for another night.

Upon arriving at Erie the next morning, after about four hours' flying, I found all the members of my flight had safely reached there the first day in 5½ hours from New York. They had flown through the rain, mostly by instinct, since the visibility was bad and the maps we carried were of little use.

Western Pennsylvania is rough and well covered with woods, offering few

THE BEST-KNOWN LANDMARK OF THE NEW WORLD

The members of the First Alaskan Air Expedition bade farewell to the Statue of Liberty at noon, July 20, and it was a welcome sight upon their return, October 20. The flying time for the round trip of 9,000 miles was 112 hours.

Photographs by U. S. Air Service

LOOKING DOWN UPON GOVERNOR'S ISLAND, NEW YORK HARBOR

Photograph by U. S. Air Service

PILOTS OF THE ALASKAN EXPEDITION

From left to right, Captain St. Clair Streett, Flight Commander; Lieutenant C. C. Nutt, Lieutenant R. C. Kirkpatrick, Lieutenant E. H. Nelson, and Lieutenant C. E. Crumrine.

spots where landing an airplane is possible. Few landmarks are identified easily until one reaches Lake Chautauqua, some 40 miles east of Erie. Erie itself is clearly identified from the air by the peculiar shape of a peninsula that extends into Lake Erie and hooks eastward.

The rain continued for several days, soaking the field at Erie until it was a bog. Pilots and mechanics were kept busy oiling metal parts to prevent rust. Every part of the machines was examined constantly, for we had 9,000 miles to cover in these vehicles, and in the regions we were to traverse, spare parts could not be obtained.

The townspeople of Erie overwhelmed us with invitations and many were the kindnesses showered upon us by visitors to our field; but we were eager to get away as soon as possible. We watched the heavens and studied the weather reports as we oiled and mended and waited.

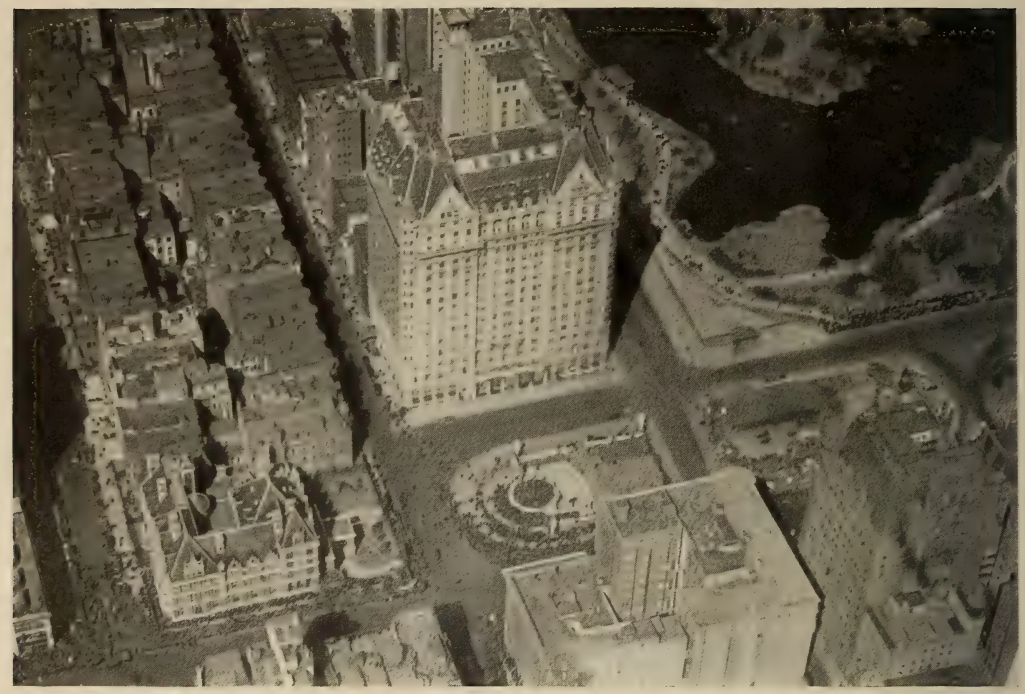
MIRED IN THE ERIE FLYING FIELD

Finally, on July 20, five days after leaving Mineola, the storm subsided and we determined to push on to Grand Rapids, Michigan.

Lieutenant Crumrine, in Number 3, started off first, in order to take some oblique photographs of the field from the air. He settled himself into his seat, waved us adieu, and taxied over the heavy turf. He opened up his motor and started down the field. Suddenly his wheels cut deep into the surface. He quickly cut off his motor, but the momentum of the machine carried it a hundred feet or so deeper into the soft ground, where it eventually stood with one blade of the propeller sticking in the mud.

A team of horses was required to drag the De Haviland out. This field, apparently quite substantial on the surface, had been converted by the long and heavy rains into a wretched bog. The airplane was not injured, but the mishap had demonstrated how impossible it would be to get away from so soft a surface.

The balance of that day we spent in rolling the field. To our great dismay, the Kelly truck roller stuck fast in the mud, and then the horses, in trying to



THE PLAZA AND CENTRAL PARK, NEW YORK CITY

Photographs by U. S. Air Service

A VIEW OF HARLEM RIVER FROM THE AIR (SEE ALSO PAGE 521)

Photograph by U. S. Air Service

THE HEART OF NEW YORK—TIMES SQUARE

pull out the roller, themselves became bogged!

A THRILLING TAKE-OFF

Finally, late in the afternoon, Lieutenant Crumrine wheeled his machine again to the starting line and, with the motor turning over, examined the prospect ahead. He had six hundred feet of runway which had just been rolled. Then came a line of trees forty feet high which had to be cleared. With considerable anxiety we gathered around to watch his take-off.

Crumrine is a finished pilot. If any one could get out of such a field, he could. He opened up the motor and started down the course, full out.

When almost at the end of the runway his wheels still clung to the mud. With increasing speed he headed straight on into the line of trees, absolutely unable to stop his momentum or to turn aside.

While our hearts mounted up into our throats and a momentary paralysis stopped their beatings, we saw Crumrine suddenly stick the nose of his airplane straight up. It zoomed the tips of the trees like a rocket, leaving only a foot or two space to spare. It was the closest call I ever want to see.

Crumrine snapped his photographs, then straightened out his course for Grand Rapids, and disappeared. Unwilling to risk any other machines on such a perilous get-away, we decided to stay over in Erie another night. With gloomy spirits and bad tempers, we put up our machines for the night and went into town to send in a report to Washington.

Photograph by U. S. Air Service

THE LAKE FRONT: MILWAUKEE

The U. S. Army airmen crossed Lake Michigan slightly to the north of Wisconsin's chief city. They flew over the widest body of water to be crossed on the voyage at an altitude of 7,000 feet (see text, page 508).

Next morning, July 21, we were up early and were examining the surface of the field at 6 o'clock. It was drying rapidly. At 9 o'clock Lieutenant Nutt took off successfully. Lieutenant Kirkpatrick followed. Number 1 was last to get away.

After so melancholy an experience in civilized Erie, Pennsylvania, what must we expect in remote Alaska, where airplanes have never landed, were my thoughts as I headed straight out across Lake Erie.

FLYING OVER LAKE ERIE

The day was misty and dull. Land was out of sight ten minutes after starting. Only gray-green waves, directly below me, were visible. Setting a course by 284 degrees on the compass, I flew for an hour and ten minutes, now and then imagining that I could detect in the motor's roaring a note of distress that might indicate its death rattle. The first view of the Canadian shore was a welcome sight.

Flying sweetly over fair farming country, where a forced landing held no terrors, in sharp contrast with the chilly waters of Lake Erie, we reached and crossed the lower end of Lake St. Clair and landed for fuel at Mt. Clemens, Michigan, after two hours and forty minutes flying.

Here is located Selfridge Field, a government aviation field, named in honor of Lieutenant Thomas E. Selfridge, one of the American pioneers in aviation, who lost his life in an airplane accident at Fort Myer in 1908. After reporting to the commanding officer, I again left the ground and after an uneventful flight through thick weather and occasional showers, we sighted the Grand Rapids field and saw the three machines of our flight drawn up on a line, awaiting our arrival.

Crumrine had landed before dark the previous afternoon without mishap. Nutt and Kirkpatrick had flown over Selfridge Field without landing and had dropped down upon the Grand Rapids field on schedule time.

WINONA, NESTLING ON THE MINNESOTA SIDE OF THE MISSISSIPPI VALLEY

On both sides of the city hills rise sharply to an altitude of 1,000 feet and the prevailing winds through the valley often present difficult problems for the aviator landing on a small field (see text, page 509).

Photographs by U. S. Air Service

THE LANDING FIELD AT WINONA, SHOWING THREE OF THE FOUR PLANES ON THE GROUND

Photograph by U. S. Air Service

THE MISSISSIPPI RIVER NORTH OF WINONA

Again we were overwhelmed with invitations and kindnesses by the citizens and aviators, who came out to the field to welcome us. We remained on the field until 10 p. m., carefully grooming our airplanes for the next day's flight. Then we were free to avail ourselves of the hospitality of Grand Rapids.

SAILING 7,000 FEET ABOVE LAKE MICHIGAN

At 11 o'clock next morning all Grand Rapids was assembled around the field to see us take off. We left the ground at thirty-second intervals, taking off across the wind and down the race-track, which circled the field on which we had landed. We climbed to 2,000 feet and got into formation.

Setting a course of 284 degrees for Winona, Minnesota, and with an east wind blowing 15 miles an hour, we left Grand Rapids behind us, and twenty minutes later found ourselves above Grand Haven, on the shores of Lake Michigan. Visibility was not good, a ground mist limiting the view to a 10-mile radius.

We had reached an altitude of 7,000 feet as we approached the lake, so that in case of motor trouble we might have a longer distance to glide before reaching the surface of the water. From this elevation the De Haviland can glide, with dead motor, to any point within eight or nine miles.

Four ships were sighted as we crossed the lake, and, as may be imagined, we kept each ship fondly in view as we listened for unusual sputterings from our motors. An hour and ten minutes flying over water brought us above Port Washington, on the west shore of Lake Michigan.

At this juncture, and just as I was feeling particularly pleased with having placed behind us the widest body of water to be crossed on the voyage, I noticed that the indicator on my dash-board did not show any air pressure. I signaled my mechanic to fly the machine while I seized the hand pump, and the balance of the distance to Winona I pumped vigorously to maintain the flow of gas. Thus we continued with undiminished speed until the valley of the Mississippi was reached and the little town of Winona was sighted, nestling between the hills. Here I took control of the airplane and made the landing on the reserve tank.

Photograph by U. S. Air Service

ST. PAUL, MINNESOTA, FROM THE AIR

The domed white building in the left distance is the State capitol. Severe storms in the vicinity of Fargo, North Dakota, the next landing place, justified the airmen in enjoying the hospitality of the Twin Cities for two days.

On both sides of Winona the hills rise rather sharply to an altitude of 1,000 feet. The valley between runs northwest and southeast, so that the prevailing winds are always in one of these directions. An aviator must determine, before he lands his machine, the direction of the wind, and if possible he always heads directly into the wind as his airplane glides down to the field. If the wind is blowing 30 miles an hour, his speed of landing is increased or decreased by 30 miles, depending upon his coming in with the wind or against it.

If the field is small, it is of the utmost importance to notice the direction of the wind by observing smoke drift on the ground, then head into the wind and permit it to retard the speed of the airplane in relation to the surface of the ground.

The citizens of Winona insisted upon our staying over to attend a luncheon arranged in our honor by the Chamber of Commerce of that city. I found a small particle of dirt had jammed open the pressure relief-valve on my gas tank. This was quickly removed, our gasoline and oil were replenished, and, as Minneapolis was but an hour and a half distant, we decided not to accept Winona's kind invitation.

I should say here that it is quite impossible to express adequately our thanks and appreciation for the wonderful hospitality extended to us by each community on our route. From city officials, from private citizens, and from fellow-aviators we received the most flattering and most kindly consideration.

THE TWIN CITIES HAVE A SUPERB FLYING FIELD

At 6:10 that evening we left the people of Winona standing gazing up at us with their "noses in air," as the French put it, and just an hour later we were joined on our route by a Curtiss airplane that had set out from Minneapolis to meet us and escort us in.

While still some distance from the Twin Cities we sighted ahead the glaring white race-track of concrete situated at

THE FALLS OF THE MINNEHAHA, MINNEAPOLIS, MINNESOTA

This lovely cataract, immortalized by Longfellow as the Sioux name given his heroine in "Hiawatha," richly deserves the appellation Laughing Water.

Photograph by U. S. Air Service

FARGO, THE METROPOLIS OF NORTH DAKOTA, TWO AND A HALF HOURS BY AIR NORTHWEST OF MINNEAPOLIS

the Speedway, in the center of which circle was the airdrome.

Four miles south of Minneapolis and four miles west of St. Paul, this landing field, smooth of surface, free of obstacles, and ample in dimensions, will prove a boon to commercial aviation and will place the Twin Cities well in advance of their rivals when this important development of air transportation gets under way.

My little flight closed up into close formation, and thus we circled the race-track's 2½-mile course before landing.

The people of the Twin Cities are enthusiastic over aviation. They applied for and obtained an aërial mail service by agreeing to furnish accommodation for the mail airplanes.

The country surrounding these cities is ideal for flying, landing fast airplanes being possible almost anywhere without danger of disaster. The Aviators' Club and the Chamber of Commerce confidently expect that their airdrome here will become the aëronautical center of the middle northwest.

We were now about to leave the busy centers of the United States for the wilds of Canada. It was with especial care that we looked over the airplanes that were to carry us ever farther away from the source of supplies.

For two days severe storms raged about the region of Fargo, North Dakota, which was to be our next landing place. We improved the time, therefore, in polishing up motors and strengthening machines.

MINNESOTA AND DAKOTA LANDSCAPES FROM THE AIR

At 11:47 a. m. on July 24 we bade our hosts of new friends good-by, and left the hospitable ground of the Twin Cities behind us. With a 10-mile wind across our line of flight, we set a course for Fargo, 225 miles distant.

BINDERS AT WORK ON A NORTH DAKOTA FARM: A LAND OF SMILING FIELDS

Ten minutes of flying through clouds brought us suddenly out into a beautiful, clear sky. For the first time we feasted our eyes upon the famous clear landscapes of the West.

From our altitude of 5,000 feet we could see the horizon, 40 or 50 miles away, all around us. Never had I flown through an atmosphere so pure and clean. Innumerable small lakes dotted the lovely landscape. Smiling and well-kept farms occupied every foot of dry land.

Our motors hummed along joyously, turning the propellers 1,400 revolutions per minute. We were moving slightly faster than a hundred miles per hour, with the aid of a favorable wind.

Soon we sighted our destination, surrounded, as usual, with motor cars and hundreds of spectators awaiting our arrival.

Another public luncheon was being held for us, and again we were compelled to disappoint our hosts, for our first attention was due our machines. We munched sandwiches while we looked over our motors, washed down the ships, and refilled the tanks with fuel, after our short jaunt of two hours and twenty-four minutes. Then we gladly accompanied our hosts into town.

Fargo is the largest city in North Dakota, and it is situated in the center of a country of great distances. Good landing fields abound anywhere within a radius of 200 miles, and the use of the airplane in this locality will prove to be of infinite value.

Excusing ourselves early that evening, we looked over maps and weather reports and piled into bed at an early hour. Tomorrow's flight would be the last hop over Uncle Sam's territory until Alaska was reached. Our machines were in perfect condition and the spirits of the pilots and crews were high. Although the difficult part of our journey was still ahead, our hearts were light and we had every confidence in the success of our expedition.

Start was made for Portal, North Dakota, next morning, July 25, with a gentle 10-mile wind on our tail bearing us along. Under 4,000 feet we found the air remarkably bumpy, probably a natural aftermath of the storm. Above that level the air was as smooth as velvet.

As we progressed, the terrain became rolling and, finally, rocky. Numerous alkaline lakes dotted the landscape.

Crumrine snapped photographs as we flew, notes were taken for recording full description of all details that might be of military interest, and a careful log was kept of each incident and feature of our journey.

With a favorable wind all the way, we covered the 290 miles to Portal in three hours and ten minutes, landing at 1 o'clock in the afternoon.

Although we had procured advance information as to the size and location of all the landing fields on our route, we discovered that there were many small details that had not been disclosed to us.

LANDING ON A CITY DUMP

Some of these overlooked details caused us costly delays and trouble. At the Portal field, for instance, which we found just over the Canadian line, to the northwest of the town, we followed our usual custom of flying low over the field, circling it two or three times while we studied the surface of the ground to note obstructions, such as ditches, fences, or stumps. Lieutenant Kirkpatrick came down first, landing perfectly, but cutting his tires badly on the glass that was strewn along the runway. The town had used this field for a dump in times past!

Lieutenant Crumrine and I landed simultaneously, without mishap. Lieutenant Nutt landed last, rolled over an inconspicuous bump, and snapped off his tail skid.

These minor accidents illustrate the nature of the repairs that were necessary to be made each night before our little caravan could be ready for the next day's flight.

A garage at Portal was the only possible source of help. After attempting to weld a vertical shaft without success, we picked up a section of a Ford axle which happened to be exactly the same size. This was installed and proved to be a very satisfactory brace.

All our repairs were completed by 8 o'clock that evening, and everything was in readiness for our hop-off into Canada the next morning. The country people for 50 miles around had assembled to witness our arrival and to help us in our work. They were very cordial and we learned from them something of the nature of the country over which we were to fly on the morrow.

A SURPASSINGLY BEAUTIFUL VIEW OF SASKATCHEWAN

If the readers of THE GEOGRAPHIC will turn to their maps of Saskatchewan, they will find portrayed a wide, smooth country, fairly dotted with small towns and villages. If they had been with us on the morning of July 26, 5,000 feet aloft, flying through a sky of surpassing loveliness, the air so clear that it tingled, the flat farms spread out beneath them with extraordinary distinctness as far as the eye could reach, they would have believed readily enough that the entire map of the district was spread before their eyes.

The atmosphere is so astonishingly clear and the view so extensive that it becomes confusing to follow a set course, because of the beautiful sameness of the scenery.

The Canadian Pacific Railroad ran beneath us. Tyvan, 40 miles east of Regina, we hit squarely, flying by compass, checking up our course by the railroad.

Every village along the railroad had its two or three huge grain elevators. The whole fertile area beneath our wings appeared rich in wheat-fields. The terrain as far north as Last Mountain Lake was perfectly flat. In this view from the air, one is impressed with the vastness and richness of this country.

Last Mountain Lake is a beautiful body of water extending northeast from the Regina vicinity almost to Watress, 70 miles away, yet it is not over three-fourths of a mile wide at any part. We were still 40 miles away from Regina when we saw it distinctly outlined ahead.

LANDSCAPE A GIGANTIC CHECKERBOARD

A sense of unreality is felt as the aviator sits, seemingly motionless, in the cockpit of his machine a mile above the gigantic checker-board of crisscross section lines which cut up this flat landscape and disappear away into the horizon, where they blend. As we proceeded we noticed thousands of acres of this land which have never been cultivated. Houses and ranches were few and far between.

Saskatoon and its river came into view

© Clinton Johnson

A TORNADO IN NORTH DAKOTA

The photographer who recorded this phenomenon says: "I noticed a very peculiar condition in the clouds. There was no wind blowing. The weather was hot. Clouds were moving from several directions to a common center, where the cloud-mass grew constantly darker and more threatening. There appeared to be no rain coming from the storm. Hanging downward from a low line of clouds, three whirling, funnel-shaped projections appeared, the two outside being soon drawn into the one in the center, which almost instantly started downward and soon was whirling along on the earth. The tornado was about ten miles from the camera."

Photograph by U. S. Air Service

THE BLACK HIGHWAY MARKS THE BOUNDARY LINE BETWEEN THE UNITED STATES AND CANADA AT PORTAL, NORTH DAKOTA

Note the shadow cast upon the ground by the airplane from which the photograph was made.

40 miles distant. We snapped photographs of the town and the landing field before we landed. A large white sign spelling W - E - L - C - O - M - E, near the hangar on the airdrome, spoke cordially to us and gave us our first intimation of the exceptional courtesies we were to receive from our Canadian cousins. We were met by the mayor, the city fathers, and by many others, and were welcomed warmly. We were officially given the freedom of the city and were extended every possible courtesy.

At first the crowds were given permission to inspect our airplanes. They had never seen machines of this type, and when they were told that these were the same airplanes we used in the war, they were greatly interested and examined them curiously. But the crowd became so densely packed about us that we could not proceed with our work. We reluctantly asked the chief of police to clear the field. This being done, we quickly finished refueling, and at 5:30 were ready to accompany the Saskatoon delegations to the city. On this first flight into Canada we had spent four hours and fifteen minutes in the air.

The mayor had procured rooms for us

Photograph by U. S. Air Service

SASKATOON, ON THE SOUTH SASKATCHEWAN

at the King George Hotel, but first he took us to the Y. M. C. A. rooms, where we were given an opportunity to take a swim. Then a public dinner in our honor followed. During the dinner I received a telegram from the Canadian Air Board, extending its compliments and congratulations. After dinner we proceeded to the City Club, where we were serenaded by the band of the Veterans of the Great War.

Saskatoon is only eighteen years old. It has beautifully paved streets and the houses have every modern convenience and luxury. The city is planned for infinite expansion. It is the center of the Saskatchewan wheat belt and its grain elevators can be seen for miles around. The University of Saskatchewan is here and the large office buildings and hotels are the equal of any in the country. Never have I known a people more enthusiastic over their city. As is usually the case in spacious countries, the individuals are generous, broad-minded, and unselfish. Their hospitality to their American visitors was unbounded and spontaneous.

Although we were out early next morning for a 6:30 start, it was almost 10 before we left the ground. Most of Saskatoon was assembled to wish us good luck, and we could not leave without shaking every kind hand that was extended to us. After circling the field in formation, we headed for Edmonton, in Alberta, flying 269½ degrees on the compass.

FLYING OVER A LAKE COUNTRY

Twenty minutes out of Saskatoon and we were over the lake district, in which section the Indian reservations are situated. This country, just north of the North Saskatchewan River, is practically undeveloped. All section lines, so noticeable up to this point, disappear; the landscape is covered with small lakes; there are few settlers and little tilled land. Landings would be difficult, for the ground is covered with very thick swamp poplar 20 or 25 feet high.

Going west from Rose Haven, on the spur of the Canadian Pacific Railroad, the land again becomes clear and well tilled.

Flying into a head wind of 20 miles an hour, we tried every elevation, from 100 feet up to 7,000 feet, but the wind seemed the same at all levels. This fact is peculiar to a flat, prairie country.

Photograph by U. S. Air Service

THE PEOPLE OF SASKATOON HAD NEVER SEEN MACHINES OF THIS TYPE

At first the citizens of the hospitable Canadian town were given permission to inspect the airplanes, but soon the crowd became so dense that the airmen could not proceed with their work of overhauling (see text, page 515).

Lake Manitou, another beautiful body of water, soon appeared below our wings. One wondered why such an exceptional summer resort is going to waste. Fully 20 miles wide in places, several large islands with beaches of white sand dotted its surface.

From this lake we followed the valley of Battle River for 50 miles, leaving it when Beaver Hills Lake was sighted. This lake proved to be a shallow body of water with marshy banks.

Enormous and well cultivated fields extend over this entire area, unbroken until some 35 miles from Edmonton, when the ground was again covered with muskeg, lagoons, and small lakes. Just before reaching Edmonton we saw the first pine and spruce timber, bordering the river for about five miles on each side.

COLD-WEATHER SUPPLIES OBTAINED AT EDMONTON

Circling the city of Edmonton and taking several pictures from different sides, we landed on a field in the northeast section of the city, only to find that we had picked the wrong field. We had sent ahead for fuel, and this and the city fathers were awaiting us on the other field. Apologizing for our mistake, we again took off and landed at the spot prepared for us, where we found awaiting us several thousand people. Among them were the members of the Edmonton Board of Trade, who pressed us to come at once into town for luncheon. We compromised by accepting an invitation to supper at 7:30. In the meantime sandwiches and coffee were brought to us and we proceeded with our repairs.

Lieutenant Nutt had broken a wing skid and bent his right aileron horn on the second landing. My machine had sprung a leak in the gas tank. Many minor repairs were necessary, so we decided to stay over at Edmonton until a thorough overhauling of the airplanes was completed. We were at the jumping-off place now, facing sparsely settled, mountainous country.

Edmonton is a city of 70,000 population and is the metropolis of this section. The country about here is rich in coal and probably oil. A new railroad, being laid northward to the Peace River section, will lay open the tremendous resources of another rich region.

Jasper, our next objective, lay 197 miles deeper in the mountainous country. From now on it would be necessary to move with the greatest caution.

Old settlers in Edmonton gave us reassuring data concerning the route ahead. We neglected no opportunities to learn every fact available about the terrain, the climate, the landmarks for guidance, the height of the mountains we had to pass, and the character of the landing fields

Photograph by U. S. Air Service

TYPICAL NORTHERN ALBERTA LANDSCAPE, WEST OF EDMONTON

In the foreground is wooded marshland. In the middle distance meanders a serpentine wheat-field which follows the course of the most fertile land. In the background is a more symmetrical field.

that were being prepared for us in towns ahead that had never seen an airplane.

We procured heavy blankets for the cold nights that might be spent among the snows of the Rockies. Heavy clothing, food, and ammunition were likewise purchased. We interviewed train dispatchers to get weather reports from stations along the line. This information was found to be more reliable than that from any other source.

TURNING BACK FOR THE FIRST TIME

After four days' hard work on our machines, we bade the people of Edmonton good-by and set off on the morning of July 31 for the flight to Jasper, our stock of supplies adding considerable weight to our load.

The weather was misty and forbidding. The ground beneath our wings looked inhospitable indeed. Not a square inch of open space appeared in which to land in the event of motor failure.

To add to my apprehension, clouds through which we must pass hung low over the Pembina River; and a mountain range was on the other side of these clouds, if not actually immersed in them.

We deemed it the part of wisdom to go back to Edmonton.

Reluctantly signaling the others to turn, we took back-track for the first time on our expedition since leaving New York.

Upon reaching Edmonton, I communicated with Jasper and found the weather was clear there, though at Edson, half way from Edmonton, fog and low clouds

Photograph by U. S. Air Service

THE CANYON OF THE ATHABASKA RIVER

The straight white line cutting diagonally across the picture is the road-bed of a transcontinental railway.

were reported. We decided to wait until the morrow.

On August 1 we were away at 9:37 in the morning. The wind blew fairly strong from the northwest and the day was bright and clear. As we flew over the Pembina River country I regarded the forbidding nature of the ground below that yesterday had been hidden by the fog. The terrain was rough and rocky. Rivers and streams flowed through deep gorges the sides of which were thickly wooded.

To the right and left, away from the streams, the entire country had been devastated by forest fires. Millions and millions of jack-pine and fir had been burned flat or left with ugly short stumps sticking up to mar the desolate landscape. The employment of a few airplane squadrons in patrolling the forests would have prevented the waste of this valuable timber. From our perch, 2,000 feet above the ground, we could see every point of ground for 30 miles around.

The tiniest column of smoke appearing in all that region would be instantly noted by an observer from the air, and if he could not extinguish the fire himself, he could note its exact location and could

hurry a forester to the rescue within the hour.

Reaching Rocky River, we noticed the foothills giving way to the increasingly high and rugged peaks of the Rocky Mountains proper.

Now, for the first time, snow peaks came into view. A haze had settled over this colder elevation, as the morning sun lifted the moisture from the ravines. The snow-clad mountain tops, shining almost pink in the sunlight, burst suddenly upon our view.

Turning north still more, we picked up the Athabaska River. We passed over the little town of Pocahontas, flying between Jasper Lake and Brides Lake, and swung into the valley of the Athabaska.

THE GRANDEUR OF THE GREAT DIVIDE

The magnificence of the scenery about us was beyond description. One was overawed by the solemn grandeur of the first sight of the Great Divide. We were flying at 6,000 feet over a scene of surpassing grandeur. Below us lay myriads of ghostly gray peaks, colored here and there by verdure and by shafts of sunlight. Scattered among them were crystal lakes so deep in color as to appear artificial. From every side hundreds of gleaming cataracts tumbled down sheer mountain cliffs, dashing and whirling dizzily along their deep-worn canyons until they were all gathered together in the more placid progress of the Athabaska.

Our motors hummed sturdily over this terrible landscape—terrible to the anxious pilot who is constantly straining his eyes to select the site for a forced landing should his motor fail.

As we flew along above the river, the valley widened and we dropped down to 1,000 feet above the river's bed. Ahead of us a gigantic pair of buttresses stood shoulder to shoulder, appearing to resist invasion into the regions beyond. Only the resistless torrents of water, that for centuries had worn deeper and deeper its passage, and the airplane, that scorned all earthly impediments, dared look for an outlet there.

Passing over the crest of one buttress, we gazed ahead. They were sentinels, guarding the valleys beyond; a level plain stretched before us, a plain covered with quaking aspen and jack-pine.

At the north end of this flat valley the Snaring river poured into the Athabasca from the west. Beside the Snaring River lay our landing field.

AIRPLANE A STRANGE SIGHT IN JASPER

Landing was made after a flight of three hours. It was a pleasant surprise to find a splendid field, after all of our apprehensions concerning Jasper. Special efforts had been made to make the runway smooth, under the supervision of Colonel Maynard Rogers, superintendent of Jasper National Park. Colonel Rogers hopes that one day this field will be the headquarters of an airplane squadron of the forest fire patrol of Jasper National Park.

The people of this remote country had never before seen an airplane. The interest and curiosity with which they examined our machines and the variety of questions we were obliged to answer may be imagined.

Colonel Rogers had provided a Chinese cook, abundant supplies, and several tents with pine-boughs bedding for our coming. Aside from the ferocious man-eating mosquitoes which harassed us sorely, we greatly enjoyed our camping out in these wilds. Bears and coyotes are so bold that the residents of Jasper are compelled to lock up their butter and sweets from these midnight prowlers.

We tried swimming and fishing in the mountain creeks, neither of which seemed very satisfactory, as the mosquitoes bit and the fish did not. At 11 o'clock that night, when the cold grew so bitter that even the mosquitoes were numbed, we rolled up in our blankets near the side of the fire to keep warm.

Awake at 6 in the morning, the valley seemed filled with a rosy light, although the sun had not yet risen above the mountain ridges to the east. We were still on the eastern slope of the Great Divide, although from our elevated position on the previous day's flight we could look over the rim and view the other side.

A FIRE SCARE IN THE AIR

As we rose from the ground that morning, after another prodigious meal prepared by the Chinese cook, we circled the town of Jasper at about 4,000 feet and took our photographs before starting on

© Fairchild Aërial Camera Corporation

THE ENTIRE ISLAND OF MANHATTAN AS SEEN FROM AN AIRPLANE 8,000 FEET ABOVE NEW YORK HARBOR

This remarkable photograph was made on a crystal-clear Sunday, with a minimum of smoke from office and manufacturing buildings. The Hudson River is at the left, the East River and its five bridges at the right, and the Harlem River meanders northwestward to the Hudson, in the background.

Photograph by U. S. Air Service

THE HEART OF WASHINGTON, LOOKING EAST FROM THE LINCOLN MEMORIAL

From the Washington Monument, in the central foreground, stretches the Mall to the white group of Capitol, House and Senate Office Buildings, and Library of Congress. At the left is the symmetrical Ellipse, adjacent to the White House and its grounds. The white circle at the extreme left locates the administrative buildings of the National Geographic Society, at 16th and M Streets, four squares north of the White House, and the circle to the east marks The Geographic annex on the railway yard. In the right foreground are the Tidal Basin and Potomac Park Driveway.

Photograph from U. S. Air Service

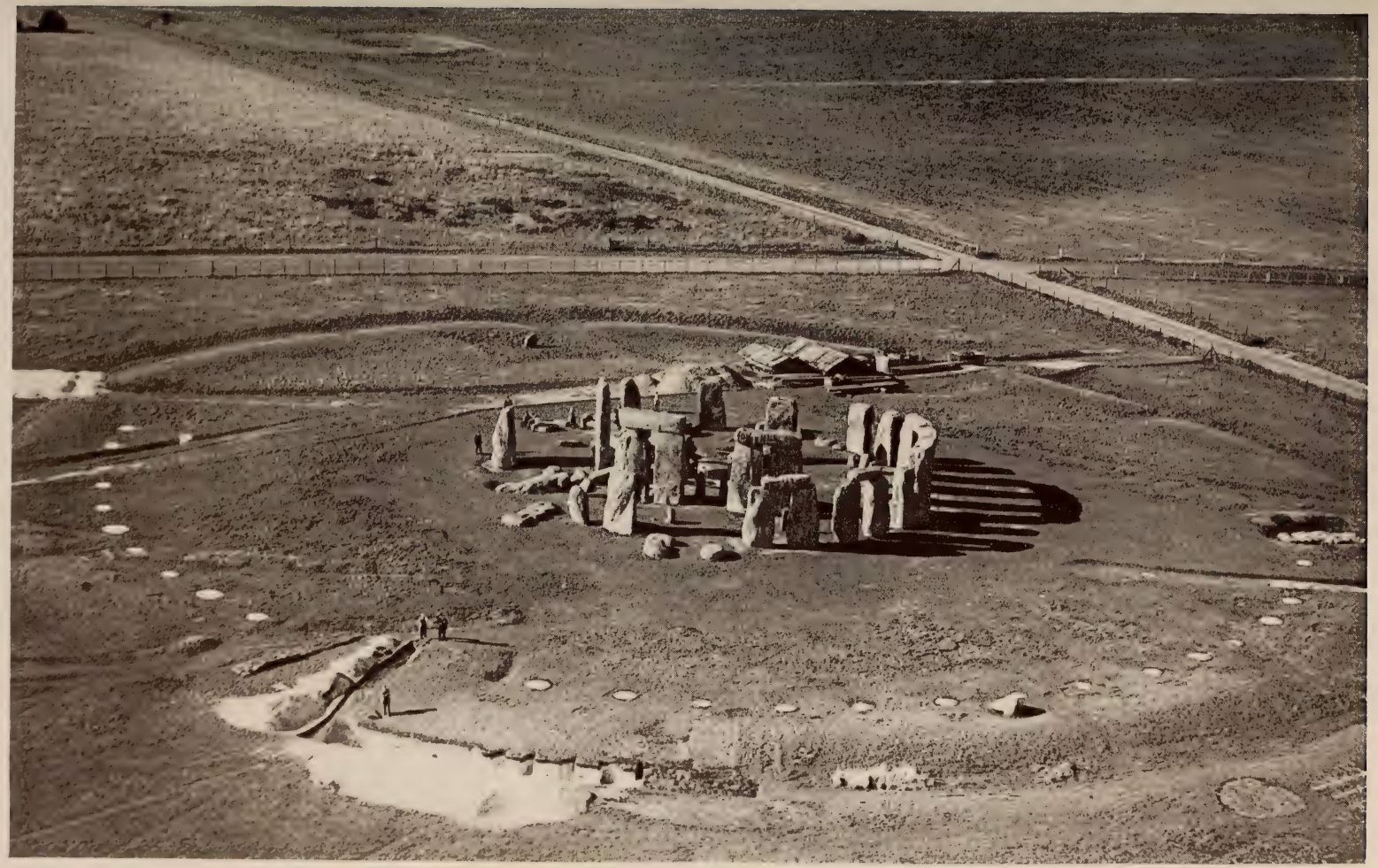
THE NATION'S CAPITAL, LOOKING WEST FROM THE CAPITOL GROUNDS

In the immediate foreground is the Library of Congress, with the House Office Building to the left and the Senate Office Building to the right. The domed building midway between the Capitol and the Washington Monument is the New National Museum. In the distance, on the banks of the Potomac, rises in stately grandeur the Lincoln Memorial, which is to be dedicated on Decoration Day this year.

Photograph from "Topical," © Central Aerophoto Co., Ltd.

THE HEART OF LONDON—TRAFALGAR SQUARE AND THE NELSON COLUMN

In the foreground, the building with the roof of jumbled appearance is the National Gallery; at the left rises the spire of St. Martin in the Fields, while behind it (in the left background) is Charing Cross Station, before which stands Charing Cross, in the Strand. Far down Whitehall, the building with the hollow square is the War Office. In the upper left corner is the Charing Cross Bridge across the Thames.



Photograph from "Topical," © Central Aerophoto Co., Ltd.

MONUMENTS OF THE PREHISTORIC PAST: STONEHENGE, WILTSHIRE, ENGLAND

An airplane view of the most imposing relic of a forgotten people in the British Isles. The mysterious stones stand in the center of Salisbury Plain and have been variously attributed to the Phœnicians, the Belgæ, the Druids, the Saxons, and the Danes. Myths of the middle ages credited the monuments to the magic of Merlin, who was supposed to have transported the circle from Ireland, whence, previously, giants had carried it from Africa.

© Underwood and Underwood

THE PALACE OF VERSAILLES IMMEDIATELY AFTER THE SIGNING OF THE PEACE TREATY

Note the delegates to the Peace Conference, grouped at the entrance to be photographed; the motors at the side of the palace, and the crowd on Paris Avenue, in front of the building.

© Underwood and Underwood

THE ROMAN ARENA AT NIMES, FRANCE, DURING A BULL-FIGHT

In this airplane view thousands of people are shown crowding the passageways in an attempt to gain entrance into the already-thronged arena, where formerly gladiatorial combats were staged. This is the best-preserved amphitheater in France and dates from the first or second century of the Christian era.

Photograph from The London Electrotype Agency, Ltd.

GIBRALTAR FROM THE AIR

Recognized throughout the world as the symbol of military impregnability, Gibraltar presents an interesting study from an elevation of several thousand feet. Guide books inform the reader that "foreigners are never allowed to see over the fortifications, to take photographs, or make drawings near the fortifications."

© Wide World Photos

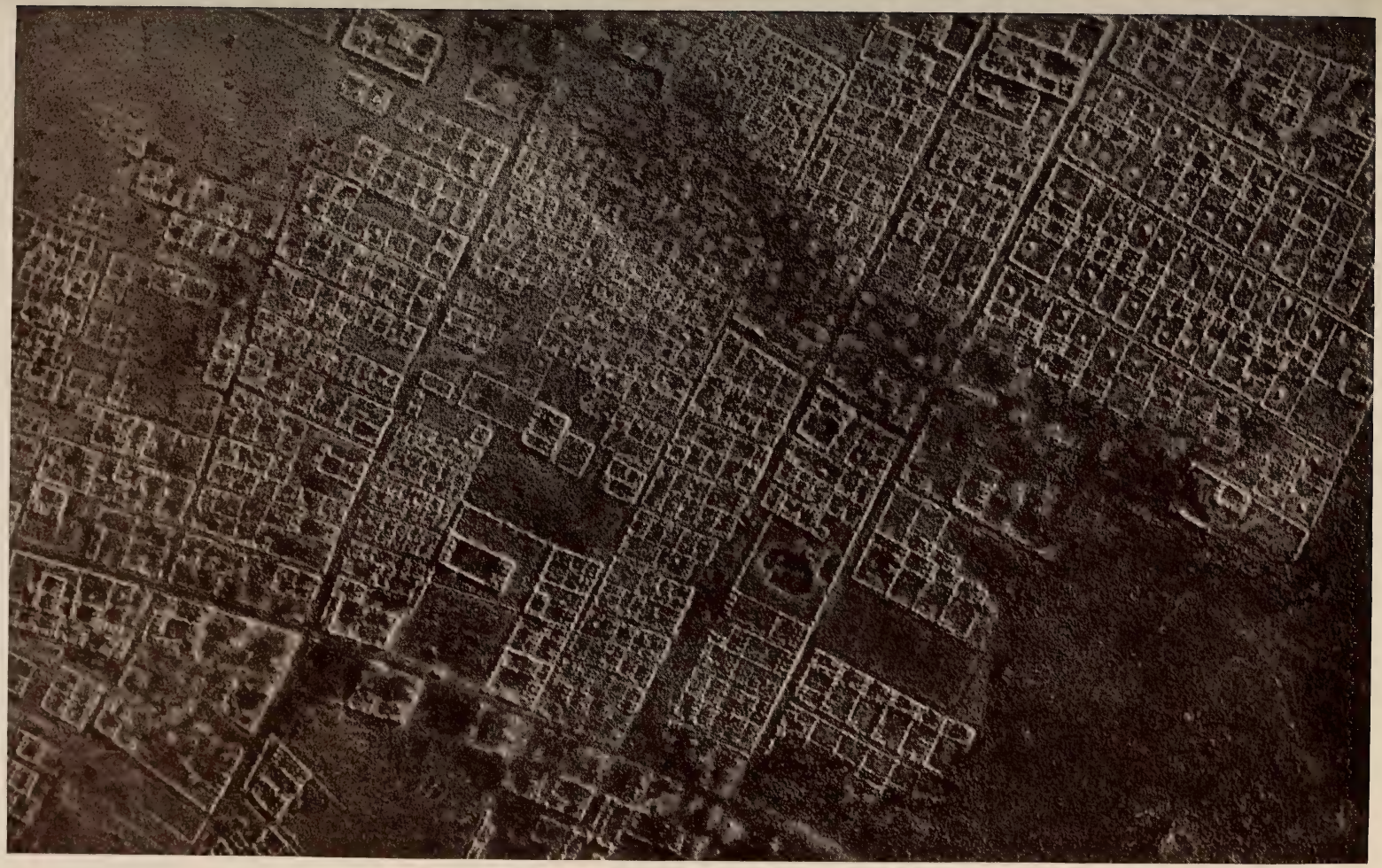
THE SMOKING CONE OF POPOCATEPETL, MEXICO'S MOST FAMOUS VOLCANO

Rising to a height of nearly 18,000 feet, this snow-covered mountain is one of the most majestic peaks of the Western Hemisphere. It is a valuable sulphur mine. The Indians employed in gathering the sulphur fill their sacks with the substance and then slide down the snow slopes.

Photograph from Albert T. Clay

THE RUINED MOSQUE AND SPIRAL TOWER OF SAMARRA, ON THE TIGRIS

The mosque was built in the ninth century, when the Caliphate was moved from Bagdad to this site. The walls of the ancient mosque and traces of ruins about it can scarcely be recognized, except from an airplane. (See also the illustration on the opposite page.)



Photograph from Albert T. Clay

THE SQUARES, STREETS, LANES, AND BUILDINGS OF ANCIENT SAMARRA, VIEWED FROM THE AIR

Once the magnificent residence of the Caliph, extending for twenty miles along the banks of the historic Tigris, Samarra is now a mere shadow of its former greatness, with a population of barely 2,500. So completely do the ruins melt into the landscape that a traveler might pass within a few miles of the once throbbing metropolis without being aware of its proximity.

Photograph by H. Bregault

THE FIRST AIRPLANE LANDING NEAR THE SUMMIT OF MONT BLANC

The photograph was taken at the precise moment when the aviator, Durafour, touched the snow of the Col du Dome after having passed over a large crevasse.

Photograph by Ad Astra-Aëro Aviation Suisse S. A.

A HYDROPLANE AMONG THE SWISS ALPS

In the vicinity of Karpfstock (9,000 feet), the Richetli Pass (7,425 feet), Hausstock (10,340 feet), and Sardona Pass (9,315 feet).

Photograph by Jean Gaberell

HAULING DOWN A SWISS CAPTIVE BALLOON AT DAYLIGHT

Photograph by Capt. Louis Brullard

VENETIAN LANDMARKS FROM THE AIR

The world-traveler recognizes in this photograph many familiar sights—the poly-domed Cathedral of St. Mark, before which rises the Campanile; the Piazza of St. Mark; the Doges' Palace, with its double tier of columns, and in the background the island of San Giorgio Maggiore and its domed church.

Photograph by Catherine Anpher

THE FIRST ALASKAN AIR EXPEDITION ARRIVING AT NOME

The expedition was conceived by Brigadier General William Mitchell, Assistant Chief of the U. S. Air Service and during the St. Mihiel offensive Commander-in-chief of the Allied Air Service in France, whose interest in such an undertaking was first awakened while he was serving as a junior officer of the Signal Corps in the construction of the Government Alaskan Telegraph Line.

our way. Just as we were leaving the town on our course to Prince George, I noticed great quantities of smoke issuing from the rear end of my motor. Believing I was on fire, I side-slipped instantly; then, turning the controls of the machine over to Sergeant Henriques, I seized the fire-extinguisher, left my seat, and crawled forward to get a shot at the flames. A shower of oil from the engine had covered the wings and struts. They were so slippery with oil I could not get far enough out to use the extinguisher.

I frantically signaled Henriques to head for the river, crawled back into my cockpit, and prayed for the intervention of Providence. Providence replied in the nick of time to save us from a ducking. At about 200 feet above the water the smoke suddenly ceased. For the fraction of a second I waited for more smoke to follow. None came.

I seized the controls, righted the machine, and made back over the field, skimming the tree-tops for the landing field and mosquitoes and Chinese cook. The others, following their orders, had continued on their way to Prince George.

The fault was discovered to be in cold oil which had caused some back pressure in the tank, causing an overflow on hot exhaust pipes. Making everything secure again, we took off for the second time shortly after 1 o'clock, the sky in the meantime becoming overcast with storm clouds.

Along the valley of the Miette we were carried forward by a favoring wind. The lovely snow-capped mountain, recently named Mt. Edith Cavell, towered above us. Myriads of small lakes were visible, as we climbed higher, cradled between ridges and mountains covered with snow. We were fast approaching the crest of the Great Divide.

We passed directly over Lake Lucerne, a remarkable little body of water which lies on the very top of the Divide. In fact, the east end of Lake Lucerne drains into the Miette, while the west end flows into a tributary of the Fraser River and eventually reaches the Pacific Ocean.

OVER THE GREAT DIVIDE

In spite of all my precautions, we ran the gantlet of two or three snow- and rain-storms before reaching the Yellowhead Pass, through which our route led us to the western side of the Divide.

Yellowhead Pass is, perhaps, the lowest pass in the Rocky Mountains. It lies only 3,400 feet above sea-level. We cleared the rocks and bushes by less than 1,000 feet, noting on each side the actual dividing crests that permitted one rivulet of snow water to begin its flow to the Atlantic, while another was sent to swell the tides of the Pacific.

Down the valley of the Fraser as far as Urling, a spot upon my map, we hastened at 110 miles per hour. We were going down the western slope. We had crossed the Canadian Rockies.

A SOFT RIVER FOR EMERGENCY!

While a forced landing in this wilderness, so remote from human habitation, was the constant thought which had weighed upon my spirits each day since starting from New York, now that the crossing was actually accomplished. We flew along with the blithest unconcern. Here was a soft river below us, which would do if the emergency came.

Both sides of us the atmosphere was filled with the smoke of forest fires. Deep growths of Douglas fir, spruce, and pine covered these magnificent mountains. I noticed with much surprise that the smell of the burning spruce was plainly discernible at my altitude of 8,000 feet, fully 4,000 feet above the edge of the timber-line below.

Never have I felt so alone in the midst of a gorgeous universe. Snow-capped mountains formed a complete circle about us. Other mountains were green and seemed to be flat on top. Evidently a lichen growth covered these mountain meadows.

I searched intently for some signs of caribou and moose on these flat mountain tops over which we made our roaring way, but not a living thing stirred. Events were forming ahead, however, which might prove extremely interesting. A wall of blackness, streaked with occasional flashes of vivid lightning, loomed ahead of us. Amid these mountain peaks, even in the short period of our flying over them, storms seemed to gather and then disappear with incredible swiftness. The winds changed frequently, now with us and now against us.

Photograph from H. R. Charlton

"THE LOVELY SNOW-CAPPED MOUNTAIN RECENTLY NAMED MT. EDITH CAVELL TOWERED ABOVE US"

This peak of the Great Divide, rising to a height of more than 11,000 feet, perpetuates the memory of the English nurse who was executed in Belgium during the World War. In the foreground is Lake Cavell.

While still three-quarters of an hour away from Prince George, as I estimated our position, I was compelled to enter the blackness of the storm. Rain and occasional hail beat us down closely under cover. For fear of being blown completely off my course, I determined to drop down near enough to the ground to check up any drift to the north or south.

For fully ten minutes we were immersed in partial darkness. I remember yet how I watched the lightning dart from the bottom of the clouds straight into the ground.

The first glimpse I had of terra firma was a cliff, not below me, but ahead of me! I zoomed up and over the rocks by a good 100 feet, then dropped down again to within a 100 feet of the tree-tops. I feared I might pass directly over Prince George without seeing it.

And indeed this nearly happened. It was raining very hard and I could scarcely distinguish the ground. I felt that we must have reached the town, and so I turned back, and there, to my great relief, I saw houses and a road.

Back and forth over the settlement we flew, trying to get the directions so as to locate the way to the field that had been selected for our landing. Finally a blaze of light on the ground to my right indicated that a flare had been lighted to guide me. Flying low, I observed the three airplanes of my flight huddled together in the blinding rain, while around them was grouped a number of motor cars. Later I learned that I had flown over the spot several times without seeing my comrades.

A BLIND LANDING—A SMASHED WING

I made a blind landing. As luck would have it, I hit the edge of the field and smashed my left wing and tore away the whole side of the stabilizer. Ten feet more to the right would have given me an open path. However, Henriques and I were quite satisfied to step out of the damaged machine and find ourselves surrounded by friends.

The other ships had arrived without injury with the exception of Lieutenant Crumrine, who blew a tire and nicked his propeller in making a landing. His mechanic, Sergeant Long, was riding on the tail of the machine, to make it stop rolling after landing, when the airplane nosed up and threw him headlong. Fortunately he was unhurt.

Pilots and crews unanimously voted the Prince George field to be the worst, with the exception of the Erie field, that we had yet visited.

The officials and the citizens of Prince George treated us royally and gave us every assistance in making our repairs. We found a cabinet-maker in town and we gave him the job of splicing the torn panels and spars of my machine's wing. The fabric was not badly torn. Our greatest concern was to find a suitable substance to take the place of the dope needed to shrink and coat the new linen covering on the wing and stabilizer. Lieutenant Kirkpatrick finally concocted a solution from banana oil and gun-cotton which seemed to prove quite a good substitute.

All hands turned in valiantly to salvage the damaged panel. We pressed into service a local tailor to repair the linen fabric; each machine had brought along spare linen for this very purpose. In the meantime Lieutenant Nutt was sent ahead to inspect our next landing field at Hazleton, so that we might avoid a repetition of this mishap.

Although Prince George is only 500 miles from the coast, we found few people there who had ever seen an airplane. A railroad connects the town with the outside world, yet its facilities are poor and the vast natural resources of this region still remain practically untapped. The country is inhabited by intelligent men, all of whom were quick to relate the advantages of their town and the vicinity.

Lieutenant Nutt returned with the disquieting intelligence that he was sure no airplane could land safely at Hazleton. He had examined the field prepared for us and had scoured the country for a better site, with only indifferent success, reporting a site then in oats which if cleared might serve. I took the train next morning to make a personal investigation. We were indeed now in the very heart of our trouble. It was no longer a question of occasional landing fields to be used for emergency landings, but a vital one of being able to come down at all when our fuel gave out.

Leaving the train at Hazleton station,

TUMBLING GLACIER, MT. ROBSON, BRITISH COLUMBIA

Robson peak, which attains an elevation of more than 13,000 feet, lies to the north of Yellowhead Pass, while Mt. Edith Cavell is to the south.

Photograph by U. S. Air Service

THE ROCKY MOUNTAINS AT 8,000 FEET, FROM THE SOUTH AND WEST, AFTER CLEARING YELLOWHEAD PASS (SEE TEXT, PAGE 537)

a mile or two from the town, I procured a Ford car and a guide and proceeded to scour the countryside for miles around. The roads were execrable. Bottomless gorges and steep mountain slopes covered with timber were threaded by trails leading to small clearings made by the Indians, or occasionally the pasture lot of a white man.

REAPING AN OAT CROP TO MAKE A LANDING FIELD

The only field approaching adequate size for our purpose was the farm of a Mr. Bierns, which was the site originally suggested for our use and recommended by Lieutenant Nutt. But this I found covered with three feet of standing oats! Another tour of the country convinced me that we must either land on Mr. Bierns' oat-field or else turn back.

Accordingly, I called to see Mr. Bierns and explained the situation to him. To my surprise and gratification, he immediately offered to cut a runway through the oats, and furthermore declared he would roll the runway until it became firm enough to give us a smooth surface.

Leaving details in his hands, I hastened back to Prince George, where I found all necessary repairs had been completed.

On August 13, after a delay of eight days, we left Prince George at 9 o'clock in the morning, and after a flight of 3½ hours we landed in the Bierns oat-field without accident.

Across this most forbidding landscape we bucked against a thirty-mile wind. The reputation of the Liberty motor can never again be immoderately criticised within our hearing, for we most certainly owed our lives and the subsequent success of our expedition to our motors' fidelity that day.

Over twisting mountain gorges filled with rushing torrents, over forests of standing timber, over mountain ranges and peaks, we flew with anxious eyes, seeking an inviting spot on which to land, should our engines cease their labors. Our imaginations caught frightful sounds from the motors' roaring. Only when

Photograph by A. E. Preble

A GROUP OF INDIAN WOMEN ON THE YUKON WATCHING THE ARRIVAL OF PIONEER AIRMEN

Photograph by U. S. Air Service

THE FOUR PLANES IN AN OAT-FIELD AT HAZELTON, BRITISH COLUMBIA
(SEE TEXT, PAGE 543)

In the foreground is a typical miner, with his four pack-horses, heading south into the Roche de Boule Range.

Photograph by U. S. Air Service

THE LANDING FIELD AT WHITE HORSE, YUKON TERRITORY

The people of White Horse evinced extraordinary interest in aviation and were eager to discuss the possibility of using airplanes for transportation of passengers and freight in winter, when the temperature drops to 70 degrees below zero in this region.

the landing fields appeared did this nightmare vanish.

SPECTATORS MADE TO SERVE AS A STEAM ROLLER

Mr. Bierns had done his best to roll his field to a hard surface for us, but we found that the airplanes would not leave the field until the surface was packed harder still.

The advent next day of an army of sightseers, including mountaineers in heavy boots and Indians in moccasins, who assembled to see us off, gave us an idea. We marched this army up and down the runway most of the forenoon. This exercise, together with the rays of the sun, gave us a reasonably dry stretch, about 300 yards long, on which to gain speed enough for a take off.

The Indians did not seem to relish this method of white man's transportation overmuch, particularly the walking up and down for hours before leaving. One dusky visitor paused in his exertions, came to me, and said: "You heap smart man, but heap d— fool."

At 1:30 we decided upon a start. All the machines got away safely, although with great difficulty. We rose to 6,000 feet and headed northwest for Wrangell. Soon we were compelled to climb to 10,000 feet, for the country beneath us was bad to look upon from the standpoint of an airman.

Our maps were inadequate and many inaccuracies were noted. Huge glaciers and rugged declivities loomed gigantic and fearsome in the clear atmosphere. The sun shone fiercely upon the snow-covered ranges and the glare fairly blinded us. It was impossible for me to see the instruments on the dash-board after having faced this glare for some time.

The odd noises coming from the roaring motors made our hearts quail. There was not even a body of water within sight upon which an airplane could come to even a wet landing. For nearly two hours we flew over this No Man's Land. Under other circumstances the scenery might have been full of wonder for us.

A WELCOME SIGHT FOR SNOW-BLINDED EYES

We recognized the Nash River, partly from our maps and partly from the descriptions given us at our last stop. Then came the Stewart arm and we knew that Alaska was now in sight.

Just south of Stewart we dropped down to 5,000 feet and found that the village nestled at the base of an almost sheer cliff which mounted a full 5,000 feet into the air. The few buildings there were indeed a sight welcome to snow-blinded eyes, and the fact that we were again above American soil thrilled us momentarily.

A CHILD OF NECESSITY

Bursting a tire while taking off at White Horse, Lieutenant Crumrine wound a rope round the rim of his wheel and placed the tire casing over this. With his plane thus equipped, he "roared in and landed grandly at Dawson" (see text, page 547).

The thrill was only momentary, for the next glance ahead disclosed more glaciers and more "scenery," which summoned a thrill that shook out of our minds all thought of home. The glaciers reminded me vaguely of the man-eating mosquitoes of Jasper; probably because they were irritating rather than dangerous.

Across the fjordlike arm of Stewart Canal, over Bohn Canal; then, ten minutes later, Bradford Canal, all really deep inlets of the sea, we flew, and then we sighted Wrangell Island and Wrangell, the town, due north. A smudge had been lighted to guide us to the field, and this we sighted when 10 miles away.

LANDING IN TIDE-WATER

Then followed one of the most curious experiences of the trip. The field appeared to be excellent from the air. We all watched Lieutenant Kirkpatrick make his landing, hoping to benefit our own by his example. What looked like a quantity of sand flew up before his wheels when they touched the ground.

Descending in our turns, we found that in reality we were landing in a bed of salt marsh grass immersed in over a foot of water in places. The field was inundated at high tide. Our hosts had neglected to mention these circumstances, which is just as well, because this field was the only available site in that section, and landing in that amount of water is more disconcerting than dangerous.

Later we learned that Wrangell was at that moment experiencing the highest tide it had known that summer, a tide of 19 feet! We realized instantly upon landing that it was high enough to give airplanes and occupants a thorough drenching.

We were removed from Sergief Island, after our ships were put in readiness for the next day's flight, to the island of Wrangell, seven miles distant. Many of the people of the town, including the good mayor, accompanied us in the one boat to Wrangell, where we were to attend a dance given in our honor.

Due, I presume, to the weight of our load, the overburdened boat stuck on a sand-bar and remained there for an hour and a half before we reached Wrangell, where we were banqueted by the mayor. We excused ourselves early that night and were shown to our bedrooms.

Remaining over two days at Wrangell, three of the flight got away on August 16, while I was compelled to remain behind to repair a propeller I had nicked in starting.

White Horse was our next objective. Leaving the next morning at 8 o'clock with a 10-mile-an-hour wind on my tail, I flew low over Stikine River, past the Taku Glacier and above Juneau.

Clouds hung low that morning and we were forced to fly under 1,000 feet all the way. Past Haynes, the White Pass seemed to be actually immersed in the clouds. Upon reaching the pass, I found scarcely 100 feet clear air between its crest and the clouds. Through this gap we flew; thence straight on to White Horse. My companions had all arrived safely before me and were in readiness to proceed to Dawson.

The people of White Horse were very enthusiastic over aviation, although the

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THE STEAMER "WHITE HORSE" IN FIVE-FINGER RAPIDS

The most forbidding section of the entire air route lay between White Horse and Dawson, the topography being ribbed and gashed in ages past by a mighty glacier.

Photograph by Frank Lowe

THE ANCIENT AND THE MODERN METHOD OF TRAVEL IN THE NORTH

The planes made the trip from White Horse to Dawson in one hour and thirty-five minutes; the dog team would have required thirty days.

great bulk of them had never before seen an airplane. Many were the questions put to us concerning the use of aircraft in transporting freight and passengers into this difficult country.

In replying to these questions it occurred to me that, before airplanes could be judged entirely fitted for work in these chill skies, experiments should be carried out to determine how aëronautical engines would function at the extremely low temperatures experienced in this country during the winter months.

ONE OF THE MOST FORBIDDING ROUTES EVER TRAVERSED BY AIRPLANE

And, as I was to discover on the morrow, the country between White Horse and Carmacks, on the route to Dawson, is as rugged and forbidding as any ever traversed by airplane. The entire country is bare rock, formerly the bed of a great glacier, which has receded and left the topography ribbed and gashed in its passing. Landing an airplane anywhere in this region would be practically impossible.

From an elevation of 7,000 feet, this country seems to have been dug up by a gigantic plow, the furrows running north and south.

From Carmacks to Selkirk the country became less rough, until finally, at the Yukon Crossing, just above Five Finger Rapids, the river valley broadened out and occasional sites for landing fields were to be seen.

From Selkirk to Stewart one follows above the White Horse Trail to the Stewart River, and above this river to the Yukon.

All this trip I made alone on the morning of August 18. Two of the machines flew away from White Horse at 5 o'clock on the preceding evening.

Lieutenant Crumrine, who was the third man to start, blew a tire and was forced to stop and make repairs. I waited with him to make repairs. Again we prepared to take off, and this time I was first up. While I was circling about, watching Crumrine taxi down the course, I saw his tire burst again. Again he stopped before leaving the ground. I went on without him, and thus it was that I, and later Crumrine, too, flew alone over this desolate stretch.

Flying low over the river's course from Stewart to Dawson, I arrived over that historic little city almost without being seen. Crumrine would not be able to overtake us until he could procure a new tire from Wrangell, a matter of several days; so I thought; but shortly after my arrival Crumrine roared in and landed grandly on one good wheel and one improvised wheel of rope. He had simply wound a rope around the rim of his wheel and placed the casing over that (see page 544).

ARRIVING IN DAWSON

Space forbids recounting the courtesies and entertainment extended to us by the people of Dawson. Everything possible was done for our comfort and pleasure.

Dawson now is but a remnant of its former splendor. In its days of glory its population numbered 40,000. Now it has shrunk to not more than 2,000, including whites and natives.

After dinner we were taken out on the Klondike River, where we viewed the operations of the huge placer dredges. The whole Klondike Valley is now being worked by dredges and is said to be paying at approximately 35 cents per yard.

Caribou and moose furnish the majority of the meat for this community. Great hunting parties are formed during August and September, which are counted upon to provide meat enough to last over the winter months.

Ice-boxes are unnecessary in Dawson. Six feet below ground, cellars are built which preserve an ideal temperature for cold storage.

We were requested to keep a lookout for a herd of caribou reported to be in the neighborhood. It was a great disappointment to us that we were unable to make a special expedition to locate this herd for our newly made friends.

The next morning, August 19, we were off at an early hour for Fairbanks. Here spares and supplies were awaiting us. But our machines had stood up wonderfully so far, and, with the exception of a new wheel for Lieutenant Crumerine and one or two other minor parts, we were in need of nothing.

GREAT EXCITEMENT AT FAIRBANKS

Great was the excitement at Fairbanks when we arrived. We had become so ac-

Photograph by the Rev. G. F. Horwarth

DAWSON, A SHRUNKEN CITY WITH A SPECTACULAR PAST

In the days of its glory it had a population of 40,000; today only 2,000 whites and natives make this their home.

Photograph by Frank Lowe

THE FOUR AIRPLANES OF THE ALASKAN FLIGHT AT DAWSON, YUKON TERRITORY

READY FOR THE FINAL LAP OF THE NEW YORK TO NOME FLIGHT

The sand-bar shown in the picture is six miles east of Ruby. So eager were the Indians to see the airplanes that they flocked into Ruby days before the arrival of the expedition, and their demands upon the community's larder threatened to bring about a famine.

Photographs by U. S. Air Service

A METROPOLIS ON THE YUKON: RUBY, ALASKA

Photograph from Capt. St. Clair Streett

"ALL NOME CAME OUT TO GREET US"

customed to the great crowds that gathered to meet us that we took it as a matter of course. The very evident amazement of the old "sour-dough" settlers of Fairbanks, however, persuaded us that aviation would have some backers in the future, once they had fully grasped its meaning.

They could not believe that we had covered the distance from New York in 50 hours, when they had spent 18 or 20 months reaching there by way of the Yukon, in the gold-rush days. Letters we bore to them from New York and the East they declared they would keep always as souvenirs of our visit.

Fairbanks and the Tanana Valley were surprising to us by reason of the green verdure, the abundant crops, and beautiful flower gardens that bloomed luxuriantly in contrast with the bleak and forbidding country over which we had so recently flown. Here enterprising farmers took every advantage of the few weeks of sunlight in the spring and their crops grew with great rapidity. Every house boasted a well-kept garden.

Unlimited resources remain undisturbed here in interior Alaska. Not gold alone, but copper, silver, lead, coal, and tin are found in seeming abundance. Cinnabar, too, has recently been discovered in this region.

As we flew up the Tanana toward the Yukon, two days later, we saw much of this interesting country from a low altitude. Though few landing places were available, we felt a nonchalant disregard for the precautions that had worried us so much in the Canadian Rockies. Sandbars in the river appeared now and then.

Our maps, which were Geological Survey maps of the Tanana and Yukon valleys, proved to be accurate.

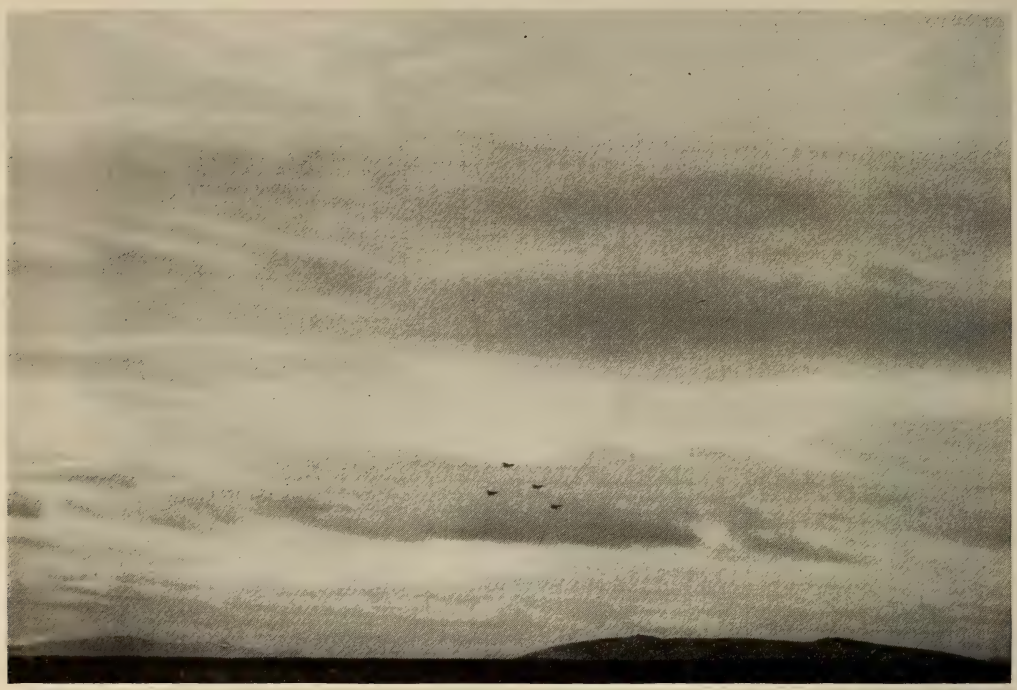
We flew through light rains until Harpers Bend was reached, south of Fort Gibbon, on the Tanana River, and then we entered the valley of the Yukon.

We overtook a river-boat on the Yukon and were tempted to fly down close enough to get a view of the passengers. The contrast between this method of transportation and our own was striking, for the boat was pushing three barges against the current and was not making more than three or four miles an hour.

Photograph by U. S. Air Service

THE PERSONNEL OF THE ALASKAN EXPEDITION AFTER ITS RETURN TO WASHINGTON, D. C.

Captain Howard T. Douglas (see text, page 552), Lieutenant C. C. Nutt, Lieutenant E. H. Nelson, Lieutenant C. E. Crumrine, Lieutenant Ross C. Kirkpatrick, Sergeant James D. Long, and Sergeant Joseph English. The Flight Commander (Captain Streett) is not shown.



© Lomen Brothers

HOMEWARD BOUND FROM NOME

Captain Howard T. Douglas, who had personally made most of the arrangements for our landings ahead of us, was awaiting us when we landed at Ruby. He informed us that the Indians had been gathering for days to greet us. In fact, so great had been the demand on the Ruby larder and so universally had the fishing been abandoned by these Indians that our expedition threatened to bring a famine to the community.

For a week before our arrival all the mining camps and fishermen's nets had been abandoned. When we came in sight squaws dropped their papooses and raced the men to the river to see us land.

Captain Douglas had cleared a small island some six miles from the town, and here we landed without accident, after a flight of two and three-quarters hours from Fairbanks. One more such flight would bring us to the end of our journey.

This last short hop was made on the afternoon of August 24, when we settled down near Nome, on the old parade ground of Fort Davis, situated between the Nome River and Bering Sea.

We had flown just 53 hours and 30 minutes from New York, covering 4,500 miles, without mishap or any breakage of serious character. The air route had provided a passage over country impassable by any other means.

After we had delivered our mail to the delighted recipients and had put up our airplanes for the night, we were carried into the city of Nome at the head of a great procession. We were banqueted by the American Legion members, then attended a reception given by the Arctic Brotherhood, where we were presented with a loving cup and with many other beautiful gifts.

One more short flight of 150 miles would have taken us to the continent of Asia, but this was not on the program.

After a few days rest we retraced our course, bearing with us photographs and maps of value to the government. On October 20 we landed safely on Mitchel Field, New York, completing the round trip of 9,000 miles in just 112 hours of flying, with the same airplanes, the same motors, and the same spark-plugs.

Some day this trip may be made overnight—who knows?

THE STORY OF THE RUHR

By Frederick Simpich

Author of "The Rise of the New Arab Nation," "Along Our Side of the Mexican Border," "Every-day Life in Afghanistan," "The Geography of Our Foreign Trade," etc., in the National Geographic Magazine

IT is a phenomenon of history—due, perhaps, to geographic influences—that, century after century, great human dramas are often staged on the same map spots. Thus the passes of northwest India, the plains of Babylonia, the valley of the Nile—what famous theaters they have been in the great wars of the world!

And the Rhine! Long ago Hugo said of it, "For thirty centuries it has seen the forms and reflected the shadows of almost every warrior who has tilled the Old World with that tool they call the sword." Cæsar, Attila, Charlemagne, Napoleon, Barbarossa, Bismarck, Hindenberg, Foch, Haig, Pershing—all have passed this way.

Down the Rhine, below where Cæsar bridged it at Andernach, below where Yankee doughboys now wash their shirts in its green flood and British Tommies play at soccer above the bones of bishops, a small crooked stream flows in from the east—a stream called the Ruhr. Merely as a river, this Ruhr, barely 150 miles long, is not important. But it flows through and lends its name to a tiny region not equaled anywhere for intensity of industry and potential political importance.

Viewed in the light of events since the war, it seems safe to predict that the course of life in Europe for the next generation may depend on what is happening now along this short, crooked, but busy stream.

"A MERE SPECK ON THE MAP"

The Ruhr, as this famous region is commonly called, is not a political subdivision of Germany; it is merely an industrial district, smaller in area than Rhode Island, but crowded with mines and factories from end to end and settled, in spots, with 1,800 people to the square mile.

Tiny as it is, a mere speck on the map, it produces in normal times over 100,000,000 tons of coal a year; it mines much of the iron ore its many mills consume, and the steel wares of Solingen have been famous since the middle ages.

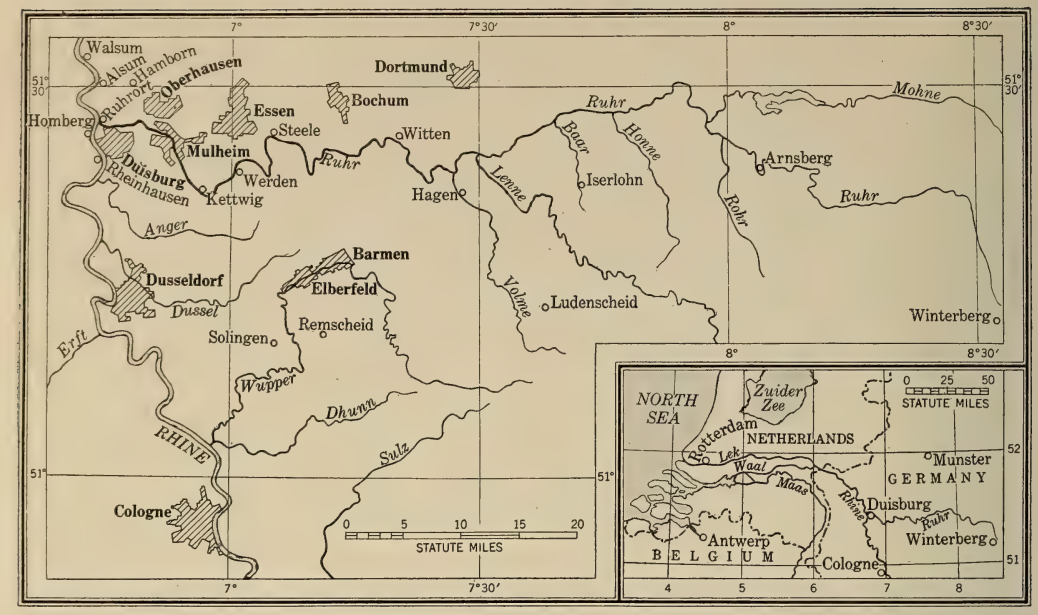
From Essen there is trundled out, month after month, a parade of finished engines, cars, and farm implements, to say nothing of tools, shafting, ship-frames, bridge steel, and plates, that compete in the markets of the world from Java to Jerusalem.

One German writer, with characteristic racial precision, figures out that the volume of raw and finished products handled in the Ruhr every working day would load a train of cars thirty miles long!

To grasp quickly just what the Ruhr would look like if painted in on a map, take your pencil and draw a horseshoe-shaped figure, starting northeast from Duisburg, on the Rhine; then curve east and southeast, so that Dortmund stands at the toe of the shoe; thence south to Hagen, southwest to Barmen, and thence straight on to strike the Rhine again at a point north of Cologne (see map, p. 554).

Then think of the Pennsylvania coal-fields packed into this tiny area; pour in the combined populations of Philadelphia, Baltimore, Cleveland, and St. Louis. Then take a flock of the biggest American steel mills and railroad shops you can think of and set them down along the Ruhr. Fill in the remaining smaller gaps with paper, silk, and cotton mills, glass factories, tanneries, dye, chemical, and salt works. Now put every man, woman, and child from the cities named hard at work digging coal, firing boilers, running lathes, or rolling steel rails, and you will get a graphic, accurate mental picture of what this roaring, rushing Ruhr really is.

Geographically, the Ruhr district lies chiefly in the province of Westphalia, bounded on the west by the Rhine. A small section of its area, however, including the city of Essen, flows over into the Rhine Province. Physically, it forms a part of the great sandy plain of north-



Drawn by James M. Darley

A SKETCH MAP OF THE RUHR BASIN

west Germany, merging with what geologists call the "Gulf of Cologne." Its climate is mildly oceanic, with the heaviest rainfall in July.

A SOLID PROCESSION OF BUSY TOWNS

Plunging suddenly into this teeming industrial field on the train ride from Cologne to Berlin, and passing through Dusseldorf, where 150 trains a day puff in and out, you are amazed at the solid procession of busy towns, at the almost endless forest of chimneys, and the pall of somber smoke that hangs over the flat, unattractive country.

In this small but highly mineralized region, where men have dug coal for 600 years, over 400 concerns now operate mines or hold concessions for their exploitation. And the Ruhr industrial region is even larger than the mining area, for it overflows to the southwest and includes the famous factory towns of Barmen, Elberfeld, and Solingen.

This whole Ruhr region, its myriad whistles screeching like a vast fleet lost in a fog, shrouded in smoke by day and lit by furnace flares at night, its forest of gaunt chimneys splitting the sky like the trunks of giant dead trees, forms a powerful picture of humming human activity.

Workmen you see everywhere—hundreds, thousands of them—busy as ants; and deep down in the bowels of earth, half a mile down or deeper, thousands more are working, stark naked, in the stifling heat and dust of the mines, delving for the coal that all Europe needs. A distinct and clannish class these pale, short-lived miners are, an hereditary social group wherein son follows father and takes pride in his calling.

So thickly do the mines crowd each other that a mining map, with round black dots to show the pits, looks at first glimpse oddly as if a charge of bird-shot had been fired at it. Viewed from an airplane, the whole highly developed region, with its tangled net of waterways, railways, and tram lines, forms a quaint pattern, like that the fishworms make crawling over flat mud spots after a hard rain.

And over all the towns, always, hangs the smoke, drifting sometimes close to earth, like the fogs that roll in at San Francisco.

THE STORY OF THE KRUPP BOOM

"Boom" towns of mushroom growth are not peculiar to America, as the startling rise of Essen plainly proves. Though founded away back in the ninth century,

Photograph from Frederick Simpich

ELECTRIC WELDING IN ESSEN

it slumbered along for hundreds of years, an obscure, unimportant hamlet. Even as late as 1850 it had hardly more than 10,000 people. Then the Krupp boom—the rise of the greatest machine-shop the world has ever seen—struck it, and today the city houses half a million.

Set in the heart of the coal-fields, crowded with endless industrial plants whose tall chimneys belch eternal smoke and fumes, the great workshop fairly throbs with power and energy. The roar and rattle of ceaseless wheels and the din of giant hammers pounding on metal seem to keep the whole town atremble.

Here every form of iron and steel article is made, from boys' skates to giant marine engine shafts. Curiously enough, even some of the smoke, or the fumes from the smokestacks, is caught and converted into a gas that furnishes more power to run the mills!

And to the 80,000 or more men on his pay-roll, the name of Krupp is above that of kings.* And indeed no industrial enterprise anywhere has ever shown a more astonishing development, reflected more dramatically the result of human concentration, or achieved a wider notoriety among the nations of the world.

More than a hundred years ago the first Krupp set up his small, crude shop and began to make by hand the tools, the drills and chisels, used by tanners, blacksmiths, and carpenters along the Ruhr and the Rhine. He also made dies for use in the mint of the government. Within 30 years, due to the old ambition for expansion, Krupp tools were known and used as far away as Greece and India.

*At the death of Friedrich Alfred Krupp, the last of his line, the factories passed into the possession of his daughter Bertha. In 1906 she married Dr. Gustav von Bohlen und Halbach, formerly a counselor of embassy, to whom the government granted permission to assume for himself and heirs the name of Krupp in conjunction with his own.

MAKING GAS MANTLES IN A RUHR FACTORY

The Ruhr is preëminently the habitat of labor. Everybody works, and nearly everybody works with his hands.

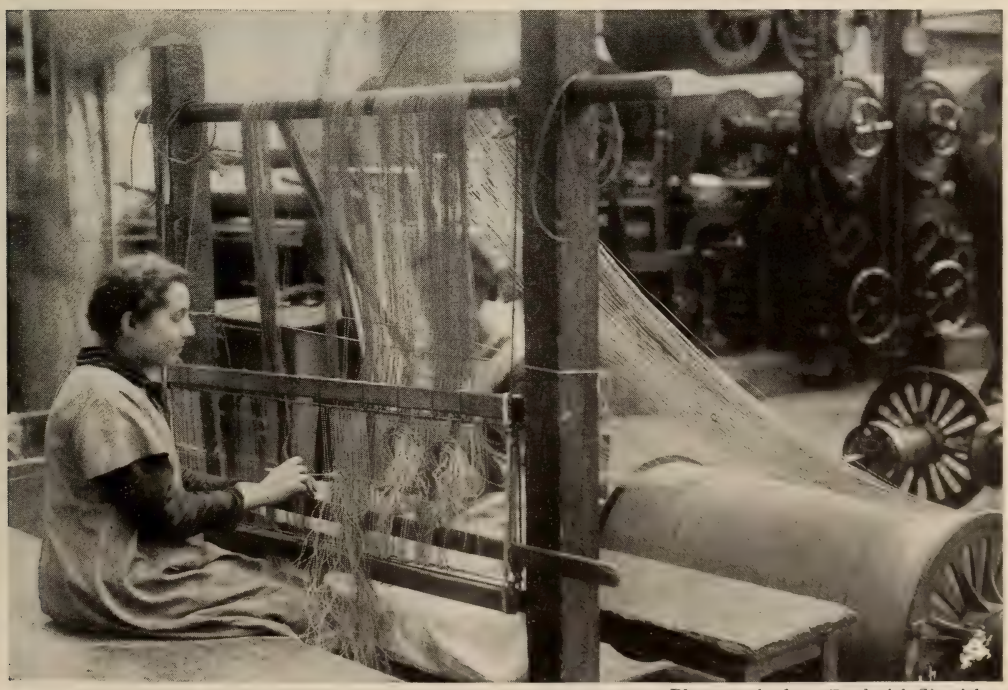
Photographs from Frederick Simpich

A COTTON MILL IN THE RUHR

There are 9,400,000 spindles like these in Germany. When they all run, in normal times, Germany takes 2,000,000 bales of our cotton a year.

IN A PAPER MILL ON THE RUHR

One of America's chief imports from Germany now is cheap newsprint paper. Europe's home consumption of newsprint paper is also enormous, especially for books and pamphlets.



Photographs from Frederick Simpich

MAKING FABRICS OUT OF PAPER

Because of cotton shortage in war times, paper came into wide use in making clothing in Germany. Hats, coats, and whole suits of paper colored to imitate tweeds were worn.

Photograph from Frederick Simpich

SOFT-COAL MINING IN GERMANY

This cheap, low-grade fuel is skimmed off the surface, so that a big "brown coal" mine on the flat plains of northern Germany often looks like the empty bed of an ancient lake. Pressed into briquettes, this soft coal becomes a staple article of commerce.

Here, about this time also, spoons were first rolled from one solid block of metal by an odd-looking machine invented for that purpose.

Then came the great era of mass production in steam-engines, hammers, steel tires for railway cars, cast-steel shafts for river and ocean steamers, and finally that astonishing output of guns and armor plate which brought the militaristic nations of the world to buy at Essen.

The daily roar of artillery at the proving grounds, where each new gun was tested, added to the din of whistles, rushing trains, and rattling gears, made pre-war Ruhr probably the noisiest place on earth.

It is noisy enough now, but the great guns are silent; Krupp makes them no more. The big lathes that once made guns for every nation, from Chile to China, now turn out shafting for marine and other engines. Box-cars for Belgium, car wheels for South America, and whole tram-line systems for the Dutch East Indies were some of the orders being filled when I saw these giant works a few months ago.

You can picture the size and scope of this colossal plant when I tell you that, literally, the coal and iron come in at one end of the flock of factories and emerge at the other in the form of finished locomotives, with steam up for testing, or as plows, all painted and ready for the farm, or as the finest nickeled instruments and tools.

But, amid all this mad drama of frenzied production, nothing can compare, in sheer human interest and excitement, with the adventurous life of the masked men who battle with red-hot iron in the heat, fumes, and dust of the furnaces and mills. It is like a moving picture from hell—a scene to baffle the descriptive skill of Dante or Doré.

Think of one block of red-hot metal weighing 85 tons tossed about with cranes and hooks like baggage on a dock! Then from between giant rollers, with a deafening boom and a hiss like cannon fire, the long rails and strips shoot out white hot and crawling like fiery serpents. Let a workman but stumble then, or take a

single false step, and he pays with his life.

Its famous crucible steel is the oldest specialty of Essen. To obtain it, raw materials especially chosen are melted in separate crucibles and then poured together to form the ingot. This particular steel is said to excel all others in purity; the giant ingots are absolutely homogeneous, close-grained, and uniform throughout.

Lately, too, a new stainless and rustless steel has been made at Essen. It is claimed that not even boiling nitric acid can affect it, and it is well adapted as a substitute for nickel-plate in the manufacture of surgical and other instruments.

Aside from its truly amazing industrial aspects, with its singularly adequate welfare institutions for aged and crippled workmen, Essen is only an overgrown German factory town—somber and smoky. It is the sort of place you like to see—once. At near-by Werden, fitting background to the drab dullness of Essen, stands an old Benedictine abbey, used now as a penitentiary.

Photograph from Frederick Simpich

A BOAT LOAD OF PEAT FROM THE MARSHES

Over these canals millions of tons of bulky freight—peat, coal, stone, and cement—are moved every year. To these canals in winter thousands of skaters come for Europe's greatest cold weather sport.

The Ruhr River itself rises on the north side of Winterberg, in Sauerland, flows northward past the romantically situated town of Arnsberg, and thence winds on down into the mining district around Hagen. Here, after receiving the waters of the Lenne, it twists on past Witten, Steele, Kettwig, and Mulheim, getting greasier and blacker as it washes past coal dumps and foundries, till it joins the Rhine at Ruhrort. From this point, also, the Ruhr Canal connects it with Duisburg.

From Witten to its mouth, some 43 miles, the Ruhr is navigable, with the aid of a dozen locks, but low water often delays the boats. Here and there, along its busy course, it even finds time to pause and turn the wheels of little mills and factories. Down the Rhine the trade of the Ruhr moves out to sea.

Photograph from Frederick Simpich

COAL MINERS OF THE RUHR

For 600 years men have delved in these mines along the Ruhr, often working stark naked in stifling heat and dust for the coal that Europe needs (see text, page 554).

Here water traffic fairly crowds the stream. Boats are everywhere, as thick as Chinese junks and sampans at Canton or Newchwang. But there is no jamming, ramming, shouting, and battling with oars or poles, as among the belligerent boatmen of the East. Here are semaphores, signal flags, order. Hundreds of boats are handled a day, with the same precision and speed that we handle trains at a great American union station.

At Duisburg-Ruhrort you can see scores of boats berthed side by side, as box-cars are parked in the railway yards at Chicago. Here is one of the world's greatest river harbors, a solid line of wharves five miles long.

This Rhine, this artery of Europe, this *Rhenus Superbus,* as the Romans named it when they built Cologne, how few Americans realize what it means to western Europe! From the Alps to the sea, from Lake Constance down to Rotterdam, "the village of herrings," this swift stream, green and shallow, tumbles along; into its foaming waters are crowded over twenty thousand steamers, tugs, and barges—a tonnage of nearly five millions.

And up the Ruhr and down the Ruhr, in ceaseless procession, move hundreds of

Photograph from Frederick Simpich

WRECK OF A RHINE BARGE

Thousands of these long craft, with quarters astern for the captain's family and a coop for his chickens, crowd the swift, shallow waters of the Rhine, moving 85,000,000 tons of freight a year.

light-draft boats and barges carrying coal, ore, building materials, and manufactured products.

From Cologne to London, too, by way of the Rhine and serving the Ruhr frontier, runs a regular line of specially built river-sea steamers, which do away with the cost of unloading and reloading from river barge to ocean steamer, or *vice versa,* at Rotterdam.

Ideas, as well as boats, it is said, are carried on great rivers. Here, then, may be a lesson for America on how to use inland streams. Through all this region railways parallel the rivers, cross and recross them, and compete with them; yet the water-borne cargoes continue to be enormous, taxing the capacity of twice ten thousand bottoms.

A NETWORK OF CANALS AND CHANNELED STREAMS

No country has developed its water transport to a higher efficiency The whole of Germany is covered with a regular network of canals and channeled streams, linked up with one another wherever practicable. For example, by means of the Rhine-Rhone and the Rhine-Marne canals, the Rhine is connected with a large part of southern France; in the same way, its lightest-draft barges can get through to the headwaters of the Danube through the Main and the Ludwig Canal, and to the Weser by a canal now being extended to Hanover and thence to the Elbe.

Through this service to the Danube, barges can actually now carry goods from the Ruhr to the far-away Black Sea, thus giving an all-water haul to southern Russia, Turkey, and Armenia. And in these latter regions, in the next decade, it seems likely that engines, rails, and other Ruhr products will be largely consumed.

Since its great growth began, many busy Ruhr towns have grown up along the rivers and canals, at points nearest the mineral deposits. Duisburg, or Duisburg-Ruhrort, where Mercator, the great geographer, died, and which now includes Hochfeld, Meiderich, and Ruhrort, is

SCHLOSS ELTZ, ONE OF THE BEST PRESERVED CASTLES OF THE RHINE VALLEY

The Rhine enjoys the double distinction of being the chief commercial artery of Western Europe and one of the most romantic and picturesque waterways in the world. This medieval structure towers above the narrow, tortuous valley of the Elz.

easily the greatest of all the Rhine's busy ports.

Geographically, too, the adjoining harbors of Alsum, Walsum, Homberg, and Rheinhausen are considered one with that of Duisburg. And here you see the great Rhine working at maximum capacity. Each year it hauls nearly 85,000,000 tons of freight!

Chief among these Ruhr factory towns are such places as Dusseldorf, Essen, Elberheld, Barmen, Hagen, Mulheim, Solingen, Bochum, Dortmund, and Remscheid, besides many smaller but equally busy centers.

Dortmund, the largest city in Westphalia, boasts a history dating back a thousand years. Long ago it was a free, fortified Hanseatic town, and once it withstood a siege of twenty-one months, "led by the good bishop of Cologne and forty-eight other princes." It is proud of its churches, centuries old; its monasteries, with their relics and antiquities, and its municipal museum, with prehistoric, Roman, and Germanic collections.

Hard by is the historic hill of Hohen-Syburg, where Charlemagne fought with the Saxons. From its crest you can view the vast, smoking, seething valley of the Ruhr, where drones and idlers are an unknown human species.

Then there is Oberhausen, site of the famous "Gutehoffnungshüte," one of the largest iron and steel mills in all this humming, mill-specked region.

This Ruhr is preëminently the habitat of labor. Everybody works, and nearly everybody works with his hands. An army of chemists, engineers, and technical men is employed, of course; but they form merely a small element of the grimy, dusty, sweating population that keeps the coal moving, the furnaces roaring, and the big lathes turning.

The population, variously estimated at from three and one-half to four millions, is not easy to determine, because thousands come and go as the tide of trade rises and falls; and nowhere is the world-wide house shortage more keenly felt than in this densely peopled area. About many of the mines the government has set up temporary barracks, where thousands of miners are housed.

Poles and men of Polish birth, probably a hundred thousand of them, figure in the daily life of this industrial region. They have brought with them their own speech, habits, and religion and they form their own social groups. Many of them, like the hordes of "Saxongängers" who in normal times swarm down into Saxony every crop season, return eventually with their savings to Poland.

This group, though reduced by war, is still conspicuous, but has become largely naturalized and serves, too, to strengthen the Catholic element in this otherwise largely Protestant section of Germany.

In the more picturesque and less crowded spots of the Ruhr the overlords of industry have reared their villas and spacious homes; but a distinctive leisure class, an idle rich, like the groups conspicuous in Charlottenberg, Dresden, or Wiesbaden, is not found. Hundreds are here who have *retired,* but they are the aged and pensioned workmen, dozing comfortably in the clean, cosy colonies built for them in cities like Essen.

"EARLY CLOSING" IS THE RULE IN THE RUHR BASIN

Schools there are, of course, and higher seats of learning in the larger cities; there are old miners, too, detailed to teach the miners' sons how to wield the pick, to shoot out a load, or dump a push-car. And even the smallest industrial center supports its inevitable café, its park and beer garden, and its "Lichtspiel," or movie theater; but they close early, and by 10 o'clock at night the streets of Essen are as empty as the ruined streets of Pompeii; for the Ruhr miner is a sane, thrifty, and methodical soul; he knows no man who works eight hours a day 2,000 feet underground could hold his job and dip very deep into such gay night life as that on "Kurfurstendamm" or in the "Nachtlokals" of Dresden and Hamburg.

Hard times come here, as in every great industrial region, when, for one reason or another, many men are out of work; but the professional tramp, like our hobo or "blanket stiff" who rides the rods, is an unknown character.

Here, too, women workers are numerous; you see them tilling the tiny fields between the towns, handling trunks and freight about the stations, or, more to the north, digging and hauling peat from the wet lowlands.

Photograph from Frederick Simpich

THE RHINE SEEN FROM A ZEPPELIN

More conspicuously, too, than anywhere else in Germany, and standing shoulder to shoulder with the trusts and combines, the Ruhr unions and workmen's councils, the *bunds* and *vereins,* are active and influential. Public meetings, debates, and conferences, though peaceful and orderly, are never ending. Every popular idea, from birth-control and old-age pensions to mutualism and government ownership, is aired by speakers and writers. In every town, despite the high cost of paper and printing, the news-stands are piled high with new-made books and red-backed pamphlets on current labor and socialistic thought. Hardly is the ink dry on one writer's printed opinion when an opponent rushes to press with an equally plausible counter-argument.

COAL IS LIFE TO THE RUHR FOLK

But to these Ruhr folk *coal is life.* Storm center though the region is for all phases of industrial dispute, the talk of the streets always comes back to coal—coal, the key to Germany's future. Life in the mines is drama, intense and thrilling. Every man with a pick is an eager actor. Every lump that moves is that much to Germany's credit.

Such is the story of the Ruhr. Under the dirty smoke that floats from Dortmund to Dusseldorf, thousands toil to live, to help Germany pay. As she wins back her place in world trade, much that she sells overseas must come from this clangorous, prodigiously p r o d u c t i v e Ruhr—mills to squeeze juice from cane in Java, bean-oil mills for Manchuria, car wheels for Canada and the U. S. A., and farm implements for Argentina.

And, when the tumult and shouting in Russia is over, it is from this same Ruhr that she will buy much of her sorely needed engines, cars, rails, and bridge steel.

A tiny speck on the map is this heated, smoking, Ruhr, but big, like a cinder, in the world's eye—a spot that Cæsar knew, a high spot in a region old in history.

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THE FAR EASTERN REPUBLIC

By Junius B. Wood

Author of "Yap and Other Pacific Islands under Japanese Mandate" in the National Geographic Magazine

With Illustrations from Photographs by the Author

THE barakholka may not be the center of life in Siberia, but it summarizes conditions in that vast country today. Formerly, even to be seen in the barakholka meant to lose social standing. Today the fallen aristocracy are rubbing elbows with the proletariat in that second-hand market, selling their heirlooms, finery, and the articles which are considered necessities in the humblest of American homes.

The nation and the people, with millions of fertile acres lying fallow, with untold wealth in gold, semi-precious stones, coal, and iron waiting to be dug, with thousands of miles of navigable rivers and railroads, and empires of uncut timber, see their resources paralyzed by war's aftermath. It is a country on its uppers in the effort to start a new democratic government.

Russian psychology is mystifying to the nervous, aggressive American. Into the moment which he is living the Slav concentrates all the energy and determination of life or death. Of the future he seems content to dream and to scheme, and with Oriental fatalism leave the slow course of nature to work out the events.

Tragedy hangs heavy over the unending Siberian plains and hills—green and restful as a lotus bed in summer, white and with the bitter chill of death under the eternal sighing pines in winter—but there is laughter, love, and music through it all.

The larder may have been bare for days and the finery of past years soiled and ragged, with no hopes for the future, but there is always a smile and time to gossip while patiently waiting for fate to decide. The dance is just as gay, even though death may be waiting before the next early sunrise.

THE LONGING FOR A SILK SHIRT

On my first sunny morning in Chita, capital of the Far Eastern Republic, my interpreter carefully flooded the two glasses with tea until they slopped over, in approved Russian style, and announced that he needed a silk shirt. A steaming samovar always generates an atmosphere of contentment and prosperity. His financial rating at the moment consisted of ten silver roubles, equivalent to $1.58, slipped into his pocket just before the bedraggled hotel maid, routed out of bed at the unprecedented hour of 9 a. m., appeared with the melodious hot-water contrivance.

Interpreting was his first steady job in the year, during which all the family possessions, down to the table silverware, had been sold to pay the rent and feed the "keeds," as he fondly called them.

The job was almost finished and none other in sight; but in Russia the acute mental worries from cash in a trousers pocket outweigh all premonitions of future needs. He must have that shirt—real Russian style, with a heavy silk cord

THE MARKET OF HEARTACHES IN CHITA—THE BARAKHOLKA

The woman and her little daughter have the choicest of their household treasures displayed for sale in this second-hand market, a replica of which exists in every poverty-stricken city of the Far Eastern Republic.

VENDERS ARE NOT EAGER TO MAKE SALES HERE

The women and children crouch in the market-place with their personal property spread before them, while the curious stroll along in front. The aged woman in the foreground has a potted plant and a winter hat with which she must part.

Drawn by James M. Darley

A SKETCH MAP OF THE FAR EASTERN REPUBLIC

Four-fifths of the 1,800,000 inhabitants of the republic carved from Siberia are peasants. Its area is equal to the combined areas of the new republics of central Europe—Germany, Poland, Czechoslovakia, Austria, and Hungary.

around the waist and silk embroidered collar, cuffs and skirt hanging outside the trousers.

MARKET PLACE RESEMBLES A STREET FAIR

The few streets of little stores which once had been the city market-place had grown into many blocks of cubical frame sheds. It resembled a street fair. One wondered how there could be enough business in the poverty-stricken land to keep it alive.

Like a miniature city, the stands clustered according to commodities. Some offered comestibles, among which boxes of cigarettes with long paper mouthpieces, a fire precaution for the protection of Russian whiskers, and dusty black blocks of pressed tea predominated.

Another street was for dry-goods, where Chinese stands crowded as close together as in their narrow home alleys of Canton, with cheap calico prints, Turkey reds, silks uncertain in quality and origin, spools of thread, and needles able to bend like a hairpin.

Buriat peasants, fat and greasy, with carts of flour and fresh meat; swarthy

LUMBER IS CHEAP AND ACCESSIBLE IN CHITA

Timber is lavishly used in building houses and fences in this corner of the new republic.

THE "LAST WORD" IN RESIDENCES IN CHITA

Thousands of persons in Siberia are living in box-cars. These citizens of Chita No. 2 have cut the rails with the idea of converting their rolling-stock homes into permanent abodes (see text, page 585).

LOVERS' BRIDGE BETWEEN CHITA NO. 1 AND CHITA NO. 2

The rickety single-plank structure over the turbulent stream gets its romantic name from the need of a strong arm to reassure timid, maidenly pedestrians.

A SWIMMING PARTY IN SIBERIA

The warm summers of long daylight tempt the nearly two million people of the Far Eastern Republic, with scarcely ten bathing suits among them, to the enjoyment of this sport. This section of the Onon River, which resembles a lake scene in New Hampshire, has been reserved for the women bathers.

MUNICIPAL WEIGHING-YARDS IN CHITA

Both buyer and seller can have flour, grain, and other bulky commodities weighed on the public scales which each city furnishes.

A CHINESE CUTLER IN MANCHULI

Scissors, knives, crude Chinese razors, and other kinds of cutlery are displayed in the rough, and sharpened by the merchant while the customer waits.

GOING TO THE WEDDING

A bridal party is nearly always gay in Chita, despite the hardships and poverty which exist in every home.

Georgians, with putty-like soap and desperate home-made candy; Russian shops for tea and cakes, with unkempt waiters, and all the hawkers and traders habitual to where commerce is primitive and unlicensed.

A HEARTACHE WITH EVERY SALE

In the center of one of the soft, sandy streets, where the stores and stands spread apart, the barakholka stretched for two blocks. These merchants did not have the luxury of roofs over their heads, and their stocks were spread on the ground, carried in a basket or, if their offering was limited, held in an outstretched hand.

To most of them bartering was a new experience—a flutter of hope when a glance fell their way and a heartache if a sale were made and another family treasure gone. Like the wares they offered, they were of all ages and sizes, some practical and others hopeless, hard and worn or shy and embarrassed by the adversity which was new to their lives.

It was an epitome of Siberia today—industrially, commercially, and socially.

The interpreter could get a silk shirt. In fact, he could get anything he wanted, either useful or ornamental. All had been used and some of it so long used that it had passed the useful stage—carts, pianos, music-boxes, furniture of all descriptions, clothes for every size and sex, soiled collars and cuffs, shaving sets, tooth-brushes, family albums with photographs of bewhiskered men and old-fashioned women, unknown and valueless except to the owners, mouse-traps, lamps, books, paintings, candlesticks, soldering irons, tools in many varieties, silverware, jewelry enough to stock a loan bank, and locks off cabin doors. When everything is sold a lock is no longer needed.

The tragic merchants of the barakholka waited patiently in two lines down the broad street. Around them crowded the curious and the speculative; for some, mostly Chinese and thrifty sons of Abraham, had money with which to buy bargains.

THE TRAGEDY OF A WEDDING SHAWL

Near the end of the nondescript line stood a young woman in her early twen-

THE VEGETABLE MARKET AT VERKHNE-UDINSK

Peasants bring potatoes, beans, and other green produce in carts and baskets to sell in the open market.

A SIBERIAN BREAD-WAGON

The rough loaves of brown bread are baked at home and hauled to the market on the clumsy home-made carts.

A STREET-CORNER STAND IN A SIBERIAN VILLAGE

The ex-soldier is eking out a living by selling cigarettes, cakes, empty tin cans, and other knickknacks to the natives. The woman's winter footwear is a pair of Korean straw sandals.

ties. A little round-eyed girl of three or four held one of her hands and her swelling lines indicated that another was expected in the family. A black-silk lace shawl was twisted around her head and over her shoulders, while one like it lay over the other arm, for sale.

Her hat, and a Russian woman would rather go without stockings than without a hat, had already been sold. Now another piece of wedding finery was on the block.

"Skolka stoy?" the interpreter asked.

"It's 35 silver roubles ($5.35)," she replied in a tone so low and hesitating that it was more a question than an answer.

AN OLD LADY'S BASKET OF KEEPSAKES

He shook his head. She offered the other one, which she wore around her shoulders. It was better. The price would be the same. Her husband was sick and they must have money for food. It was an old story, undoubtedly true, but two men had no need for a silk shawl.

An old lady had a basket of family

keepsakes—a once gaily gilded ikon, odd spoons, photographs in frames, half a dozen Russian books, a pair of earrings in a plush case, and the knickknacks which are dear to motherly hearts.

In one hand she held a silver creamer, worn by many years of faithful service. It was gay with ornate flowers and scrolls, while across its front "To our loving mother from the children" had been engraved in Russian. Certainly, in those happy days of long ago, there had been no thought that the mother would some time carry it to the tawdry barakholka.

Two soldiers elbowed through the crowd. One was carrying a ponderous silver watch with a flimsy gold chain and locket of cheap enamel. It was 10 gold roubles ($5) for the outfit, and the owner was profuse in his assurances that the timepiece was reliable. The face of his companion was wreathed in smiles. He had been one of the guards on our train into Chita the previous night. His greeting was as effusive as if he were meeting a friend of a lifetime.

"I just sold my gold watch for 25 roubles," he explained. "It was a present when I was graduated from the university in Petrograd, four years ago, but we've had no pay for two months and my wife needs other things more than the watch. Tonight I'll take her to the theater and we can get along until there is some money for us."

A swarthy son of the Caucasus, with a handful of neatly folded Soviet paper money and a leather pouch hanging over his shoulder, stopped to listen.

"A 10,000-rouble Moscow bill for 2 roubles 80 kopecks, silver (40 cents)," he offered.

"How much sugar will your 10,000 Moscow roubles buy?" asked a workingman. The money-changer shook his head and the crowd guffawed.

THEY JEST AS THEY FACE STARVATION

We worked our way on down the line. A middle-aged man was joking with a woman holding a worn corset, which she offered for 3 silver roubles.

"A handsome young lady like you can't go to the dance without her corset," he was saying.

"There isn't enough in my stomach to need a corset," the woman spiritedly retorted. The crowd applauded her.

BURIAT CITIZENS OF THE FAR EASTERN REPUBLIC

The Buriat-Mongols, among whom are some of the most thrifty, reliable, and well-educated citizens of the republic, have been accorded special political recognition by the new government (see text, page 590).

To one side, back of the line and away from the jostling crowd, a couple bent with age were sitting on an iron bed, a brightly polished brass samovar between them. It was for sale, with its story of many years in the quiet Russian home. A Russian home is no longer a home without its samovar. The old man eagerly explained that his wife had taken it to the river that morning and polished it with sand.

"Yes, this is our bed," he answered. "We've slept on it many years and our

A BURIAT BOY AND HIS MOTHER HOMEWARD BOUND AFTER THE DAY'S MARKETING IN CHITA

babies all have slept on it, but they are gone now and we can sleep on the floor. We have not much longer to go and we don't need much."

HIS PET RABBIT FOR SALE

Two little boys were backed against one of the frame sheds, as if fearing they might be seen. One of them stroked a fat, blinking rabbit. The other was affording consolation and encouragement.

"Papa says I must sell it, for we haven't any flour," he explained, starting to cry. "A dog killed my other rabbit, and papa says this one may get killed. But I must have 4 silver roubles (57 cents) for it."

The actors and the scenery change, but the tragedy under the surface of comedy is the same. There is a barakholka in every Siberian city, every place with an industrial population, which must sell the clothes off its back to get the food which the peasants and Chinese traders have. Food is plentiful and cheap in Siberia; but even the cheapest of food is unobtainable for those without a single kopeck. The meager rations which the government doles out is all that saves most of the city populations from starvation.

A white-haired woman, with a neat black cap on her head and a black hat in a trembling hand, was talking to a girl in her later 'teens, the first time I went through the Chita barakholka. The girl was pretty and her light cotton dress was neat, though mended and faded. She had a pair of high leather shoes, still serviceable for the bleak, wet days of Chita, to sell. She wore white slippers, scooping sand with every step, and her white stockings were generously patched and darned.

"Why are you selling your shoes?" I asked.

"Oh, warm weather is here and I don't need them now," she replied, blushing and turning away.

"And there are other things I need more than shoes," she added with twitching lips.

Two weeks later I was taking a short cut through the barakholka and noticed the white-haired woman with the little black cap. She had another piece of her wardrobe to offer, but the girl was not there. I inquired for her. The little woman explained, calmly and as a matter of fact:

"She was a good girl and came from a good home. Her father and mother died and her brother was killed by Semenov's men, who took everything. There was no work. She sold her jewelry, then her furs, her clothes, and everything except what she wore. Winter always comes,

BURIAT FARMERS COUNTING THE PROFITS OF THE DAY

and it is bitter cold in winter. Even before winter comes, one must eat.

"She had nothing more to sell except herself. A few nights ago she was at a dance. She did not go home, but went alone to the river. The next morning, when the other girls were swimming, they found her body. She is not the first and there will be many more."

FURS SOLD FOR BREAD, DEATH COMES WITH WINTER

It was warm when I was in the Far Eastern Republic, long sunny days, from 4 o'clock in the morning until 9 at night, and weather like summer in the Northwest. In the winter it is different, with the thermometer registering 60 degrees below zero and nature covered by a mantle of snow that never thaws. The winter furs and flannels sold to buy a summer's bread mean death when the icy blasts grip the country.

Of the 1,800,000 inhabitants of the republic, roughly 80 per cent are peasants, 15 per cent are in the government service of railroads, schools, telegraphs, posts, or bureaus, and 5 per cent are in private industry, such as shops, stores, flour mills, sawmills, leather tanneries and mining. It is the 20 per cent that suffers physically. The government, though without money, can supply a modicum of food to stave off stalking starvation for three-fourths of them.

In winter the Russian peasant burrows out of his log house from under the snow and the Buriat peasant of Mongol blood goes to his windowless hut in the mountains, just as they have done every year since they first pioneered in Siberia. They have food and there is more in their community storehouses, but their crudest of farm tools and their clothes, which are made for comfort rather than for style, are kept together only by constant tinkering.

A representative of a Canadian trading company showed me a sample of 10,000 thin German scythe blades which he was importing, trading each one for 60 pounds of butter or some equivalent farm product. Few commercial houses have the patience or facilities for conducting business in terms of barter, and the resumption of trade, even now that gold and silver are the only currency, is slow.

A WAITER GIVES A CUSTOMER 60,000 ROUBLES FOR SOUVENIRS

The two years of civil war which preceded the establishing of the present Far Eastern Republic not only paralyzed, but almost exterminated, trade and industry. The property and stocks of merchandise which were not requisitioned outright

SUNDAY AFTERNOON IN FRONT OF THE VILLAGE PARK AT CHITA

Band concerts, theatrical performances, and other entertainments are given nightly. A sumptuous three-course dinner costs the equivalent of sixty-five cents in the park restaurant, yet the government is feeding 3,500 persons daily at the free soup kitchen across the street (see text, page 585).

NOT AN AMERICAN, BUT A SIBERIAN, DAY NURSERY

The government has taken part of the residence of a clergyman for this *créche*, where mothers can leave their babies from 9 to 5 o'clock each day while they are at work (see text, page 592).

THESE YOUNG JUGGLERS GIVE A PERFORMANCE WHENEVER A TRAIN ARRIVES

The trio, one with three knives, another with sticks and rings, do their tricks at Manchuli station to the accompaniment of a doleful Chinese song. The leader punctuates his performance by catching his sticks on a drum, while the diminutive fourth member passes the hat for the passengers' coins.

were either looted or destroyed, violently or by decree.

The latter method was by forcing the merchants to accept the worthless paper money, backed only by the capacity of a press to print more money, which the various transient rulers issued. As many kinds of money have been in circulation in Siberia since the days of the Romanoffs as there have been governments or military chieftains.

One day I flashed a 10,000-rouble bill which I had bought for a few roubles in the barakholka on the waiter in the leading hotel in Chita. Incidentally, the hotel's proprietor was a Greek with a brother in Baltimore. He laughed at my gullibility until I explained that I wanted it as a souvenir. The next day he handed me a bundle wrapped in a newspaper. It disclosed about 60,000 roubles in bills of many colors and sizes, most of them Semenov 1,000- and 500-rouble "pigeon" notes, so called from the resemblance of their Russian eagle to that bird of peace.

"How much do you want for them?" I asked.

"Nothing, nothing; they're a present," he laughed. "I only use them for cigarette papers, and a piece of newspaper is just as good. I'm worth half a million roubles in that money."

PAPER MONEY ABOLISHED BY THE REPUBLIC

One of the first acts of the present government was to abolish paper money as legal currency. Reversion to a hard-money standard brought the old gold coins out of their hiding places.

The disciples of communism do not bother their heads about fundamentals of financial economy. Most of them believe that gold has a value as a circulating medium because the Russian eagle is stamped on it, and a gold coin is looked on with a deep and abiding hatred, as a symbol of capitalism and the dreaded money power.

However, the men running the govern-

CHITA'S SUBSTITUTE FOR A PLAYGROUND

Children whose only homes for months have been box-cars at Verkhne-Udinsk still smile and play their games like children the world over. The boy in the foreground wears only a wool-padded winter overcoat and cap.

ment were sufficiently practical to decide that a gold coin, even with the reliefs of eagle and Tsar on its faces, was better for the republic than the gorgeous paper notes of Moscow, with the stirring admonition, "Poor workers of the world, unite!" in several languages.

Even though their philosophy was outraged, a gold coin did not depreciate over night and no communist faithful has ever carried his hatred to the extent of refusing one.

A new depreciated silver coinage—5, 10, 15, and 20 kopeck pieces—minted in Japan, was put into circulation to supplement the gold. A gold 5-rouble coin exchanges for 5.10 yen, while the silver small change is worth only 28 4/7 per cent of its face value.

A traveler's difficulties in shopping in Siberia are in discovering whether prices are in silver or gold. In general, any price under 5 roubles gold is quoted in silver.

Railroad fares are collected in gold, and as the trains move with uncertainty and deliberation, there is ample time to figure out that the rate is equivalent to between 6 and 7 cents a mile in American money. On one semi-weekly train, where a check-up of the passengers was made, four had paid first-class fare, 14 second class, and 34 third class, while 56 were riding on civilian passes and 97 on military passes. On a railroad where only 25 per cent of its passengers pay fare and the balance ride free, the tariffs must be high.

POVERTY HAS OVERWHELMED THE REPUBLIC'S RAILROAD

The railroad is the most important public utility of the republic. Poverty and dilapidation have overwhelmed it, just as they have gripped the fallen genteel of the barakholka. It keeps running, which is about all. With the obstacles which must be overcome, the marvel is that even that is accomplished.

Taking the cars on which we rode as examples, the passenger coaches are unheated in winter, windows dirty and broken, electric light fixtures wrenched out bodily, lavatories filled with dirt,

OFFICIAL TYPHOID DISTRIBUTER AT VERKHNE-UDINSK

Convenience is more important than hygiene to the men who drive their horses into the muddy Selenga River, on the border between Soviet Russia and the Far Eastern Republic, and fill the city water-carts.

rough boards where once were mirrors, doors nailed shut or broken off, and the floors splintered from being used as chopping blocks. The proletariat seems to relish a martyrdom to darkness and dirt.

The lettering on the outside showed that one car had been on the de luxe Moscow-Petrograd Express. The only repainting had been to daub over the Russian Imperial eagle and stencil "D. V. R.," the initials of the Far Eastern Republic, in white paint.

On those cars which come from Soviet Russia the initials are varied to the equivalent of "R. S. F. S. R.," for Russian Socialistic Federative Soviet Republic.

AMERICAN MOTION PICTURES USED FOR SOVIET PROPAGANDA

Only one car was seen evidencing painting, a propaganda car covered with lurid colors of high-browed giants with bulging muscles, singing women, and waving banners with admonitions for the cause. Attached to this was an auditorium lecture car, the strongest attraction of which was a movie of industrial scenes in the United States—lumbering, railroad shops, automobile-making, meat-packing, and other activities.

Last July eleven months had passed since the railroad employes had been paid. They had received rations, hardly enough to keep body and soul together. One aged inspector, 30 years in railroad service, tremblingly showed me his rations for a five-day trip—four pounds of black bread and a pound of salt dried fish, the stench alone being sufficient to quiet the most voracious appetite.

Despite all this and the dangers from war and rickety equipment, they have kept on the job, men in the shops and on the trains, women and girls in ticket offices and at telegraph keys. For some it was force of habit, others had nothing else to do, and some were cajoled into it; but, without shading motives too closely, it showed a loyal devotion. Under the circumstances, all they could do was to keep the trains running and let the trimmings go.

The Far Eastern Republic has 2,920 miles of railroad, exclusive of the 1,100

SIBERIAN PEASANTS NEAR RAZDOLN

These are men of the type who form the "partizan" bands that carry on the irregular warfare in that part of Russia which Dostoievsky called the "House of the Dead."

miles of the Chinese Eastern Railroad, which also belongs to Russia. They are more of a liability than an asset.

As a part of the Transsiberian, the system of an empire stretching across two continents, these miles of road give access to the Pacific. They are more than the republic will need for many years to come.

The 1,438 miles of the Amur road parallel the river through tracts of virgin forest, a country rich in gold and coal, but undeveloped.

Geologists say that there is not a 150-mile stretch along this road where coal cannot be mined. It was constructed for military purposes, and when the war broke out much of it had not been ballasted.

THE REPUBLIC IS ONE-TWENTIETH OF FORMER RUSSIAN EMPIRE

When daylight is fading and the long shadows stretching across the plains, one realizes the vastness of Siberia—panorama of a gently undulating, silent sea, green and brown or unending white.

The area of the Far Eastern Republic is 450,000 square miles, larger than Texas and California combined, yet it is only the southeast corner of Siberia, one-twentieth of the former Russian Empire.

From Vladivostok, on the coast, to Verkhne-Udinsk, on the republic's western boundary, is more than 1,700 miles by rail, and little more than one-third of Siberia has been crossed.

Usually the train is the only sign of life. As far as the eye can see, the telegraph poles stand sentry along the winding railroad, fading away in the distance.

Everywhere are the scars of war. It may be a locomotive, rusty and half covered with sand, lying in the ditch where it plunged with its human freight. It may be the skeleton of a train, deserted on a side track, burned except for the steel framework of cars and trucks. Twisted rails, wrecked bridges, or shattered fragments, where an ammunition train has blown up, vary the picture.

A peasant's wagon, with shaggy galloping ponies and the invariable dog trotting behind, is a sign that a village is near. The lamps on the station platform are gone and semaphores stand with broken

KAPPEL OFFICERS AT THEIR HEADQUARTERS IN RAZDOLN

These men led the Kappel forces on the 7,000-mile retreat, the longest in history, from the frozen Urals, across Siberia to Vladivostok.

arms, for this is a moonbeam railroad, running without signals or headlights.

Barefoot women and children selling food and bottles of milk or home-made kvass (sour beer) are at every station. A whole roast chicken costs 50 cents; 100 fresh eggs, 55 cents; a quart of boiled milk, 2½ cents. Every passenger carries a tea-kettle for the hot water which the road furnishes free, or an empty bottle for a supply of milk, if he is not a Russian tea-drinker.

PASSENGERS CARRY WOOD FOR THE LOCOMOTIVE

At regular intervals the train stops and the conductor plods along the side, shouting "Tovarishchi—za drovami"! It is the call for the "comrades" to pile out and carry sticks from the neighboring woodpiles to the locomotive. It is a crude study in communism (see page 592).

Most of the passengers, women and girls as well as men, make their way leisurely across the fields. Some climb on the tender, and the fuel is loaded as by a bucket brigade at an old-time fire. Others stretch themselves in the sun to doze, gossip aimlessly, stroll with the girls, picking the yellow flowers or carving on the white birch trunks, or hang out

of the car windows, unmindful of the gibes from the more industrious fellow-passengers.

For thousands the railroad provides the only home. An official may get a passenger coach or private car for himself and his family, but the proletariat—men, women, and children—are herded by dozens in box-cars, anybody who can crowd in being free to pick out a corner for a home (see illustration, page 568).

In Chita and Verkhne-Udinsk hundreds are housed in box-car cities, cooking, eating, and living in the open during the day and at night sleeping on rough shelves which have been built into the cars.

Some are on the move, getting nearer Soviet Russia whenever a locomotive can be spared to pull their trains, while others have been waiting for months. Included in this west-bound tide are about a hundred American artisans each month, bound for Soviet Russia—"a country where men are free," as they explain.

East-bound were long trains carrying 20,000 Chinese refugees from Ungern's sack of Urga in Mongolia—wounded soldiers, merchants with Russian wives and Eurasian children, coolies, and an occasional European—being transported by Soviet Russia back to China.

At night every spare spot in the railroad stations—tables, benches, the tiled floors, the platform outside when the weather is good—furnishes a bed. Women muffled under blankets with babies and children; soldiers with rifles and mess kits under their arms, and travelers with their stale bread, pans, and bundles snore contentedly in the fetid atmosphere.

Even the hotels have cracked under the strain; but the weary host that sleeps in the stations lacks the few kopecks needed for a cot in the dilapidated, dirty, and overcrowded hostelries.

In Verkhne-Udinsk we managed to get a bare room with two broken iron beds in the only hotel for 32 cents a day, the Chinese proprietor a few hours later asking an advance payment of 10 cents to buy milk and medicine for his little red-haired Russian girl-wife. She sent in two glasses of milk for the travelers. A Russian believes in dividing when he has anything.

"We've had Ungern and Semenov and now we have the tovarishchi, and the good Lord only knows what we'll have next," said one woman. "Semenov gave us lots of beatings, and his Cossacks with whips kept back the crowds when the Americans were giving away the supplies, but we could get something to eat. If the American Red Cross had not been here, we would be naked now."

She wore a Red Cross sleeveless sweater above a patched skirt; the baby had a knitted cap pulled over its ears, though it was summer, and a barefoot boy was decked out in a pair of army trousers cut down to fit his short legs.

One Sunday the children from all the schools were marshaled for a parade. For days the newspapers had been printing stirring appeals to everybody to contribute a mite for those whose frail bodies were less able to withstand the hardships of life. Most of them were barefoot and bareheaded and there were none of the gay, fancy dresses which once were the holiday garb of every Russian child. It was picturesque and instructive, but tragic.

One mother brought her children, a red bandana handkerchief around her head and the dresses of the three little girls and the suit of the boy stitched from the same material. Even some of the teachers were barefoot, and more than one showed bare legs above a pair of cracked slippers.

"THE BAND KEEPS CHITA ALIVE"

The military band, with a stirring march tune, led the parade. The band keeps Chita alive. It precedes every company of soldiers, sturdy young men in unmatched uniforms, that marches through the streets during the day. In the evenings its members play at the two theaters and public gardens.

Chita even has a circus. It is mostly clowns with racy songs. On pleasant evenings the public gardens are filled, though 5 cents admission is charged. Every seat in the theaters is taken. No one attempts to explain how the strangely assorted crowd gets the price of admission. The cement-floored, free, outdoor dance pavilion is crowded also. Sometimes there is grand opera and other weeks there is a stock company or movies. The restaurant, where a good meal costs 65 cents, is almost deserted. The government free soup kitchen, on the opposite corner, has 3,500 callers every noon.

HAULING GOVERNMENT FLOUR IN CHITA

For months the only pay received by government employees of the Far Eastern Republic was an occasional ration of food.

A TYPICAL SIBERIAN CHURCHYARD IN CHITA

The churches in Siberia, since the new régime, are not supported by the state.

CHINESE COOLIES MAKING BRICKS WITHOUT STRAW IN CHITA

A LUMBER MARKET IN CHITA

Peasants from the hills haul the timber to the villages in carts resembling the tobacco schooner familiar in our Southern States. The coverings, however, are made of birch bark, blankets, or tin, instead of canvas and guano sacks.

When the serious-faced soldiers march through the sandy streets, with the band playing "The Girl I Left Behind Me," or some other popular air, even a war-wearied American is thrilled.

Nearly every morning a stern-wheeler would come down the Selenga River carrying the wounded from the fighting with Ungern's bandits while I was at Verkhne-Udinsk. Frequently 300 would be crowded on the little boat, with only a couple of nurses to care for them during the three days' voyage.

Some of the wounded hobbled ashore on crutches whittled from saplings; others crawled on their hands and knees. There were only a couple of stretchers for the most seriously wounded. They made their way to the shade of a building or to the hospital without complaint.

"We captured 300 cattle and ate meat, which was a treat," said one youth, holding a swollen foot which had not been dressed for three days.

Among Russians, the present paralysis of the country and the suffering of the people is blamed on Japan. Much of it, however, is a heritage from the revolution, the overthrow of a despotic monarchy and the launching of another government whose principals go to the opposite extreme in radicalism.

That Siberia cannot recover as long as Japan maintains a hostile army within its territory, and that a large proportion of the Japanese military do not want it to recover until it is annexed, as Korea was, is equally evident.

One Japanese expedition, a survivor of the Allied assistance to Kolchak, by holding Vladivostok can control all the country's commerce by railroad. Another Japanese expedition in the Sakhalin district, in retaliation for the Japanese defeat and subsequent massacre at Nikolaevsk, can hold similar control over the rich deposits of coal and oil on the island, the thriving Russian fisheries, the timber on the mainland, and the Amur River route of the country's water commerce.

The most serious obstacle which Japan places to the peace of the country is the substantial support, invariably characterized by Tokyo as the work of unauthorized officers, given to brigands of the type of Ungern, the Chinese Hunhutzes, and others to harass the borders.

Possibly the government of the Far Eastern Republic would not be efficient and the people prosperous, even if the Japanese expeditions were withdrawn, but the most efficient statesmen in the world could not bring peace to a country with hostile foreign expeditions controlling all its arteries of commerce and forcing it to keep most of the able-bodied men under arms to repel the systematic invasions from without.

Regardless of the bitterness of his domestic politics, there are at least eleven different parties in Siberia or Russia; for the Russian is intensely nationalistic. He is hospitable to the foreigner, but believes that Russia is for the Russian first. His bitterness against the Japanese would be the same against any other nation trying to enforce its rule over his soil or his people.

OUTSIDE INTERFERENCE RESENTED

Efforts of other nations to dictate in Russia's domestic affairs, either by armies or otherwise, has been one of the strongest political assets of the Bolsheviki in European Russia, and the same holds true in Siberia. The Russian will overlook the shortcomings of his home government, patiently endure hardships, and risk his life whenever occasion requires, if it is necessary in fighting the ignominy of foreign domination.

Several motives contributed to the formation of the Far Eastern Republic as a constitutional democracy. Soviet Russia could have prevented, but assisted instead. Moscow has been the only friend of Chita, aiding it with gold and soldiers, though extremely limited in both. However, the two republics are separate, as any one soon finds out when passing the customs guards, immigration officers, and soldiers on either side of the boundaries.

In the first place, the Far Eastern Republic satisfied the wish for a buffer state between Japan and Soviet Russia. Next, the leaders of Moscow realized that their beautiful theories of communism had been an economic and social failure, and this corner of Siberia offered a good field to try out the democracy of America embellished with some of the latest radical novelties.

The third reason, alone sufficient, was that the Siberian peasant will never ac-

WELL-HOUSE AT SEMENOV'S CHITA HEADQUARTERS

Soldiers of this Cossack leader, before they were driven from Chita, are said to have thrown fifty men and women down this well and then driven horses and cattle in to crush them.

cept a broader communism than the guild communism to which he is accustomed.

The Siberian peasant believes only from experience. An Englishman was selling a peasant a hatchet, guaranteed good steel. The peasant bit a nick in the edge before he would accept the guarantee.

The Siberian peasant averages 100 acres of land. He can have as much more as he wants to cultivate. It is there for the taking. What he raises is his own. He is willing to put his crop in the community storehouse, but the idea of turning it over to a government on the strength of a promise of clothes, tools, or a free ride on the railroad cannot be driven into his head. He will not accept communism to that extent.

The constitution of the Far Eastern Republic may have been a hand-made document when it was presented to the 400 members of the first assembly, but it showed the changes of many hands—some crude, others shrewd—before it emerged.

It guarantees rights of private property and goods; but all land, rivers, and mineral rights belong to the state. They are leased in lieu of taxes, and the novelty of paying taxes is the test of the Siberian peasant's sincere support of the government. To induce colonization in Siberia, the old Tsarist government not only remitted taxes, but gave bonuses of machinery, seed grain, or cash.

Every citizen 18 years old, regardless of sex, religion, politics, or previous nationality, can vote. Minority representation is provided for in national, state, county, city, and village governments.

Five states are created on geographical lines and a sixth on entirely new lines—the autonomous racial Buriat-Mongol State, composed of citizens at large.

The fear of a dictatorship is evidenced when, instead of a single president, a commission of seven, known as "The Government," is elected by the assembly. "The Government" is the highest executive authority. It names the premier and he selects the sixteen cabinet heads.

The church is separated from the state. A citizen is free to profess any religion or none, and religious instruction is permitted only in theological schools.

Education is free and compulsory. So is work for every citizen, not more than 8 hours a day or 6 hours at night, with further restrictions for women and children.

GRUESOME EVIDENCE OF PAST EXECUTIONS IN SIBERIA

A little girl pointed out this spot, where her uncle had been executed, and then fled in tears when the bare skull was unearthed.

Every male citizen is liable for military service between 18 and 45 years, and it is compulsory between 20 and 22. Bodily and capital punishment are abolished.

Liberty of the press, speech, and assembly is guaranteed. Citizens may also initiate legislation and have a share in the administration of all government and public functions through an elaborate and complicated "People's Control."

This is the famous system of people's commissars, in theory enforcing efficiency and honesty on the regular officials, but in practice interfering and inefficient. If one officer is not efficient, little is accomplished by placing another to watch him, and the process is like Gillett Burgess's "fleas with other fleas upon their backs to bite 'em, and so *ad infinitum.*"

The people's commissars interfere with the army, the railroad, the local administration, and every other civil function.

THE REPUBLIC'S SECRET POLICE

The "gosudarstivenaya politicheskaya okrana," shortened by the simplified spelling which the Soviet has adopted into "Gospolokrana," is the most conspicuous of these safety-supervising forms of government. It is the secret political police of Siberia, similar to the "tchresnytchnainaya komissia," or "Tcheka," which is Moscow's special commission against counter-revolutionists.

The "Gospolokrana" can arrest anybody, and does not hesitate to do so when the occasion requires. It watches everything—enforcement of the prohibition laws, food profiteering, baggage of travelers, and chiefly political conspiracies.

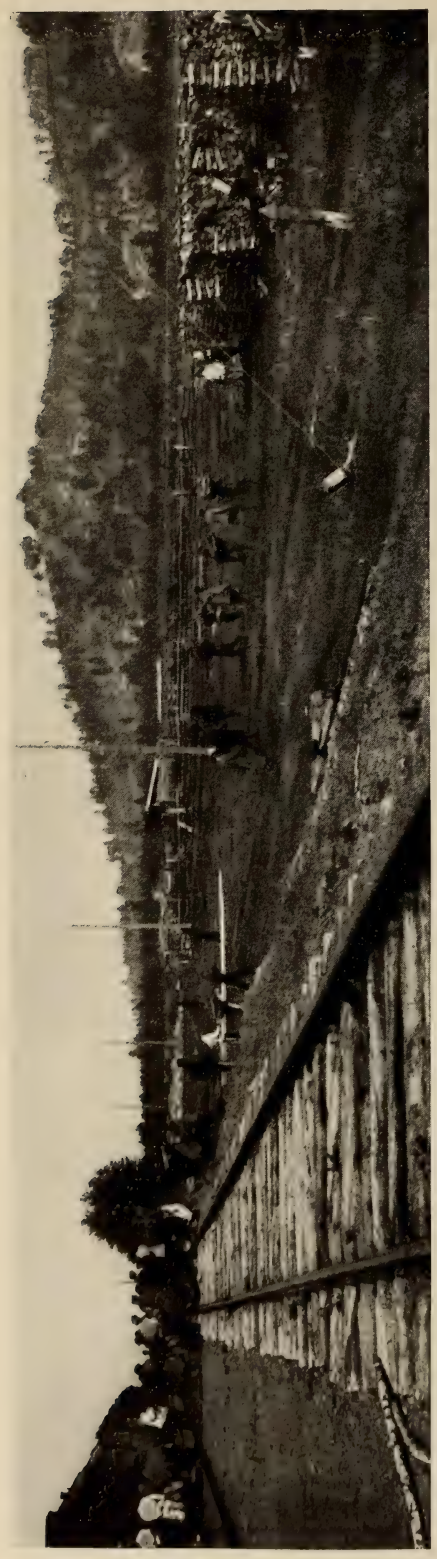
One evening its genial young superintendent was going to have dinner with me in Chita. Instead his wife came with a message that he would be busy that evening arresting the chief of staff of the army, who was suspected of corresponding with revolutionists.

This young man was an expert accountant in peace times. He had fought through the revolution, more than once given up by his friends as dead, and did not expect to retire from the present position alive.

Once he received word that several revolutionists were being smuggled out on a Japanese military train. He entered the private car of the Japanese general and requested permission to search it. The general, quite sincerely, insisted that it was impossible for the men to be in his car.

"Here's my revolver; if I'm mistaken, you can shoot me," the young fellow said.

Greatly to the amazement of the general, the men were found under some



WHERE COMMUNISM IS BEING TESTED

At frequent intervals the Siberian train stops near a woodpile and all the passengers are called upon to get off and carry fuel for the locomotive.

blankets, where they had been hidden by his orderly.

The government is struggling pitifully to maintain the schools and other civil functions provided for in the constitution. Without resources, it is hard to realize high ambitions. However, considerable is done.

One institution in Chita was a government *crèche* located in part of a church. A dozen volunteer nurses cared for nearly a hundred babies and children from 9 to 5 o'clock daily, while their mothers worked.

PROPAGANDA IS THE GRIPPING FORCE

Propaganda is the gripping force of the government. Every employee or soldier gets a free newspaper, and a Russian newspaper is always more enthusiastic for its country and some particular local party than it is for news.

Gaudy but artistic lithographs appeal to the large illiterate population, their tone in recent months having changed from appeals for soldiers to exhortations to return to the shops and fields, the advantages of schooling, and advice on fly-swatting or the extermination of wolves, boll-weevil, and other pests.

In each city is a reading-room, and the demand for books on industry, electricity, mechanics, metallurgy, medicine, agriculture, and other useful sciences largely exceeds the limited number of well-thumbed copies.

Outside, a more systematic world-wide propaganda is busy painting a dark picture of Siberia, in accord with the ambitions of other powerful interests.

Most of the fictitious stories of disorders in Siberia, embellished with a wealth of detail, originate with a mendacious publicity bureau, which is a part of the military expedition in Vladivostok.

I was goaded to frenzied activity when the American mission was in Chita last summer, long stories being printed in the subsidized newspapers of China and Japan and sent to Europe and America by press associations, of uprisings in a dozen cities, mutiny of the army, and the burning of Chita with most of the government officials on the pyre. Loafing in the shade or swimming was the most vigorous activity of Siberia at the time and Chita was as peaceful as any American village in midsummer.

THE SPLENDOR OF ROME

By Florence Craig Albrecht

Author of "Austro-Italian Mountain Frontiers," "Channel Ports—and Some Others," "The City of Jacqueline," "Frontier Cities of Italy," "London," etc., in the National Geographic Magazine.

WITH the name of Rome there comes to me always a vision of wide-open spaces radiant with blinding sunshine and of great bands and pools of velvety purple shadow. There are no half-tones in the picture. Everything lies bare to the sun or cowers in deepest shade. Along with the glare and the shadows is the splashing of many fountains, the sound of rushing waters.

It is not the Tiber, Rome's turbid river, which fills the air with music. The charm of the Tiber is romantic and in the past. That "Father Tiber to whom the Romans pray" exists only in poetry; the river of today is almost negligible in the sum of Rome's attractiveness, while ranking high among her menaces. "Too large a stream to be harmless, too small to be useful," Rome says of it; not altogether fair, perhaps, but we shall reach the Tiber again and again.

It is Rome's fountains that engage us now. No one goes to Rome expectant of them or comes away to forget. At first unmarked, later the fairest pictures shrined in memory show the flash and glitter of high-tossed spray, the rush and plunge of heavy streams, the shimmer of sleepy pools. Yet they are but tiny bits of all that we come to Rome to see and, going, strive to remember.

ROME LINKS US WITH ALL OTHER CITIES

How pitifully inadequate are words, how futile, where book upon book has been written and the subject but just begun. Older cities there are, cities that in their day were just as great, but they do not touch us as does Rome, who links us with them.

It was Rome who, with one hand yet stretched to the East, raised with the other the veil that shrouded all of Europe beyond the Alps, who brought upon the stage of the world all those rude tribes from which our race is sprung.

And can we go to her as to our own young cities, all unprepared, to tarry a week, a day, an hour? Not if we will have anything of her who can teach every one of us.

"I shall never dare to tell my Latin teacher that I was in Rome," said the president of a western university as he stood dazzled in the Forum; "I should have to confess that I gave it three days, and he said three years was too little."

Except students, there are few who can give years to any city but their own. There are very few cities in which so much can be learned in a day or two as in Rome; in ten years one could not exhaust it.

DISAPPOINTING AT FIRST SIGHT

Yet at first sight Rome is disappointing. So new, so conventional, so ready-made, so like any other European city, with smooth-paved, sunny streets, monotonous houses, trolley cars, electric lights, hotels, and little trace of those seven hills we came so far to see.

The pity is one enters the city usually upon its newest side, a side that in the memory of living man was all villas and gardens. One should come in by motor, at the north, by the old road and the Porta del Popolo, at the Pincian Hill, or be dropped ever so gently from an airplane on the Janiculum, the ridge west of the Tiber, and see Rome first as a whole, as one may from these points, not piecemeal, as one does arriving by train.

Yet if one has eyes that see, even here one may be brought speedily to that mood of loving appreciation which all visitors to Rome sooner or later attain. In the noise and confusion of puffing locomotives stands a bit of Servius Tullius' wall; in the piazza opposite is the remnant of Diocletian's baths reconstructed into a church by Michael Angelo; all those fearfully new dwellings beyond cover the gardens of Mæcenas, where Virgil and Horace were frequent guests.

In one glance we link with our own these wide-spread epochs, six centuries before Christ, His own time, three, and fifteen centuries after Him—and that is Rome.

Photograph from Arthur Stanley Riggs

THE HOLIEST WAY

At the highest point of Sacra Via, or Holiest Way, which from a simple path to the place of the ancestral dead developed into a roadway for the triumphs of the living, is the Arch of Titus, with its sculptures commemorating the defeat of the Jews and sack of Jerusalem in A. D. 70. In the foreground are the ruins of the Temple of Venus and Roma, the last pagan temple which remained in use in the Eternal City, and to the south wall of which was fastened the marble plan of the city.

Photograph by Alexander Stewart

THE TRIUMPHAL ARCH OF CONSTANTINE

In close proximity to the Colosseum (at the right) is the triumphal arch of Constantine, erected after the victory over Maxentius at Saxa Rubra in 312, when the emperor publicly espoused the cause of Christianity. The medallions and reliefs were taken from other buildings of the Trajan period.

THE ROMAN FORUM

Heart of the mighty empire of the Cæsars, source from which has come the unrivaled system of jurisprudence that has been the model of every modern nation, the Roman Forum was also the focus of architectural and civic beauty, the most conspicuous of the ancient remains in this quarter being the Temple of Saturn, with its Ionic portico of eight columns. The marble arch of Septimius Severus, shown to the right of the roadway, was raised to commemorate his wars in Parthia and Arabia. The three Corinthian columns in the left foreground are remains of the Temple of Vespasian. At the extreme right is the Temple of Faustina (see also page 598). The Column of Phocas, standing before the Rostra, or orator's tribune, may be glimpsed through the columns of the Temple of Saturn.

Far across the city, beyond the Tiber, rises a commanding ridge or hill, once Montorio, from its golden sands, now Monte Gianicolo, or the Janiculum. At its southern end a flat terrace, walled comfortably for lounging, shaded with thick-branched trees, bears an inconspicuous church and monastery, San Pietro in Montorio, the tiny "Tempietto" in the monastery court marking the spot where St. Peter was crucified.

The church has a double claim upon Americans, for it was built by Ferdinand and Isabella of Spain, and is consequently just as old as we; but visitors are very few there, for St. Peter's huge church on the Vatican attracts them all; those that come to the Janiculum do it to see Rome. It was never one of "the seven hills," but it is a good place to look over at them, especially toward evening, when the long shadows help us to define them and the golden light reconstructs for us an older, lovelier Rome.

A MODERN CITY OVER A GREATER ANCIENT ONE

East of the river is all the Rome of the ancients, most of Rome for the moderns, king, court, administrative buildings, palaces, shops, hotels—a great, busy modern city overlaying a greater ancient one.

Even from here the city looks neither lovely nor picturesque. For that side of it you must walk some moonlight night by the Colosseum, loiter on the Bridge of the Angels when star-reflections dimple the sullen river, sit silent by a fountain in a rose-scented garden when the nightingales are in song.

Now we see a yellow and gray crowded modern city, lightened here and there by clustered treetops marking a garden, pointed with stately square towers and here and there a dome.

There are no "heaven-reaching spires," although a tower or two bear pointed caps; nor can we make out clearly the undulations of those seven hills. Time and engineers have done their work. Hilltops have been laid low, valleys filled in to suit the exigencies of trolley cars.

After a while, however, details commence to emerge in the even light. The Aventine is readily marked, the southernmost hill, that of the "opposition" ever since Remus fled there from his brother; the next northward, the Palatine, with its ruins of imperial palaces, its cypresses and ilex and pine; beyond it, just visible, the tall statues in the façade of San Giovanni in Laterano marking the farther side of Monte Celio, the third of the hills of Rome. It was never high (none were—160 to 180 feet), and from here we can make out no slope, nor on the Esquiline beyond, where rise the two great domes of Santa Maria Maggiore. But between the Esquiline and us, north of the Palatine, the Capitoline Hill rises abruptly, crowned with church and palaces.

Here we get glimpses of the ancient Rome we are seeking, not on the hill itself, but between it and the Palatine—great arches, a column or two, and the huge bulk of the Colosseum.

Of Monte Viminale we can make nothing, but Monte Quirinale is marked by the royal palace and Trajan's beautiful column, while Monte Pincio, to the north, flanks the white Villa Medici with rich green.

St. Peter's and the Vatican are hidden from us by our own hill, but all the rest of tourist Rome lies like a map before us, ringed by the glowing Campagna and lovely, snow-patched mountains.

The city glows ever more golden as the sun sinks behind our hill, the shadows creep in closer and ever closer from the east, the land fades into mistiness, yet the mountain-tops are light. The last direct beam touches a dome, flashes gold, and is gone. The Colosseum flushes soft rose, then dims, and suddenly all is purple dusk, through which a myriad twinkling lights burn vividly.

RECALLING THE HIGH LIGHTS OF ROME'S PAST

Here in the dusk let us recall Rome's history or such fragments of it as we may, suiting our mood and time.

Legendary are most of its earliest pages, not fitted for the glare of day; yet how much the poorer we should be without those many legends, pagan and Christian, which illuminate early Rome as no chronology can. Rome the Kingdom is all legend, chroniclers say; yet very real, very virile, were the men who built that mile-long wall about the summit of the Palatine, who reared and trained a race

Photograph by Emil P. Albrecht

HOUSE OF THE VESTAL VIRGINS IN THE ROMAN FORUM, WITH SOME OF THE STATUES OF THE CHIEF VESTALS STILL STANDING

The Vestal Virgins played an important part in Imperial Rome, not only as conservators of the sacred fire, but in politics as well, their influence obtaining offices and favors for relatives and friends, as evidenced by inscriptions found on the statues erected by grateful recipients. Near Porta Pia lie the bones of guilty Vestals, each buried alive in a little vault 12 feet deep, with the small dish and crust and the earthen lamp that was soon extinguished in the close, damp air. It was the fatal thumb of the Vestals that gave the signal of life or death for the unsuccessful performer in the Colosseum. To the right rise the columns of the Temple of Faustina, dedicated in 141 by Emperor Antoninus to his wife.

that seven centuries later conquered the world.

Two hundred and fifty years (754-509 B. C.) this Kingdom lasts, and is then overthrown. A Republic takes its place, to give way in five centuries (509-27 B. C.), through military despotism, to an Empire, which in turn endures five hundred years (27 B. C.-476 A. D.), though for the last third of that time very weak indeed.

After that, chaos. Kingdom, Republic, Empire—all are gone; only a weak, ruined city remains.

The great nobles, the Popes, and the people struggle for mastery; there is war within and without—invasion, rebellion, open strife, and secret murder. Charlemagne is crowned in St. Peter's and sets the Pope more firmly on his throne; a new element enters, the Frankish and German emperors, but the struggle goes on. Emperors and Popes are alternately friends and foes; the city is now Guelph, now Ghibelline.

Enters Napoleon and changes the map for a brief while, and again insurrection.

Now, in our own time, a united Italy, and Rome its capital.

There is the puzzling question of the "Prisoner of the Vatican," the problem of large needs and little means, the aftermath of war with her ancient foe beyond the Alps, to tax all resources. After twenty-five centuries, Rome is still making history.

So long as men read and remember, Rome cannot die. But her history is hardly one for a peace advocate. Greece lives by art and letters, but Rome by war. Except for very brief intervals, through seven hundred years the Temple of Janus stood open, and through conflict Rome grew in riches, population, and power. The theory that nations thrive best in times of peace was not hers; they thrive upon conquest, and a weak one merits its slavery, she seems to say. Remember that she was pagan. There was no thought in her of a universal brotherhood of men.

It would be pleasant to write here that Christian Rome was successful and peaceful, but it is not true; she, too, warred—less victoriously and more viciously.

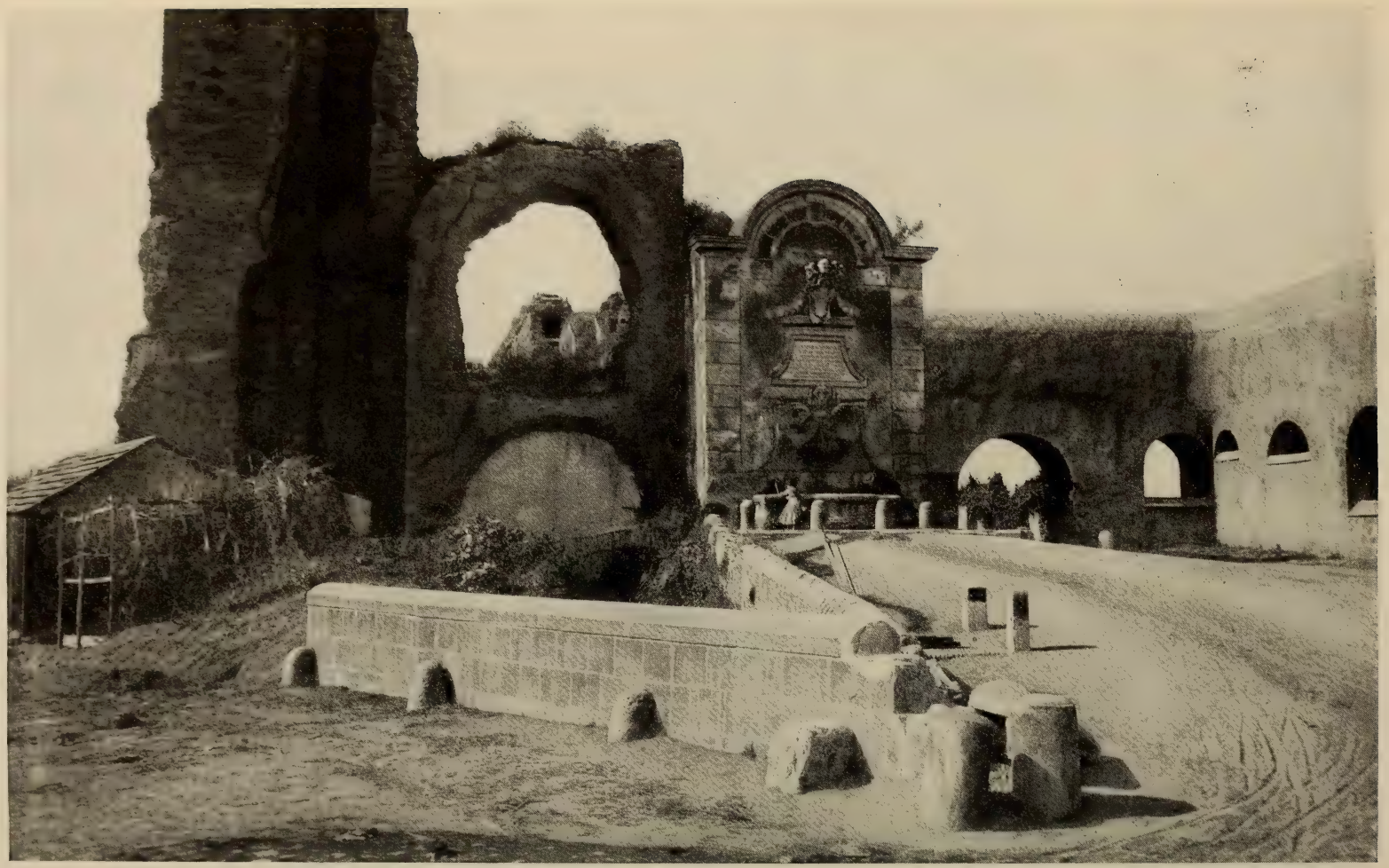
The last of the Republic, the first of the Empire, were the days of Rome's political greatness, of her wealth, her pride, her power. Out of them there come to us uncountable inspiring stories, and in the Forum, to whose temples she brought tribute from all the world, we may stage them; out of its ruins an archeologist or a dreamer can readily reconstruct the busy meeting-place as it was in the time of Brutus, or Appius Claudius, or Cæsar.

Photograph by A. W. Cutler

THE ARCH OF TITUS

Spanning the highest point of Sacra Via (see page 594) is the Arch of Titus, erected by the Senate to commemorate the taking of Jerusalem. The acts that made Titus famous in Rome won for him the hatred of the Jews, who were marched in chains in the procession of their captors and forced to lay the stones of this arch. Through the arch may be seen the towering ruins of the Colosseum.

Here, under the shadow of the Palatine, was the Temple of the Vestals; there that of Castor and Pollux, of Venus and Roma, of Saturn, oldest of them all; of Concord, the youngest. Here were the Julian and Constantine basilicas; over there the Comitium, where the patricians met; the rostra, whence Rome was harangued. Here were shops and porticos,



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THE APPIAN WAY

Constructed by Appius Claudius the Blind, during the Samnite War, and called by the Romans "Queen of Roads," the Appian Way is the oldest and most renowned of the ancient city. It stretched from Rome to Brindisi, on the Adriatic. Because of the law prohibiting interments within the walls, all roads into Rome were "Avenues of Death," the Appian Way being especially distinguished for the number and magnificence of its bordering tombs, which were constructed from the marbles of conquered countries. The ancient Romans buried their dead where the life of the city was the gayest, some of their most impressive monuments being beside the most frequented circuses.

Photograph by Alexander Stewart

THE HISTORIC TIBER

It is from the sharp bend of the Tiber opposite the Castle of Sant' Angelo that the Vatican and St. Peter's are seen at their best, as they stand out in gray relief against the sunset sky. The open space before the bridge was the scene, over three centuries ago, of the execution of Beatrice Cenci, the heroine of Shelley's famous poetic drama (see also illustration on page 602).

Photograph by Emil P. Albrecht

THE TOMB OF ROMAN EMPERORS

Constructed as a tomb, faced with Parian marble, for Hadrian and his successors, the Castle of Sant' Angelo is approached by the Ponte Sant' Angelo, with its ten colossal statues of angels. The tomb, converted into a fortress, repelled the attacks of the Goths. From the tenth century it was the citadel of Rome, the party in power overawing the people from the stronghold. It was before this castle that the permanent gallows stood, seldom unoccupied.

and little narrow ways, and the Sacra Via, which led upward to the Capitoline Hill (see page 594).

It will be all vague and chaotic at first, a jumble of meaningless stones, but presently they will take form and precision and alignment; if you watch closely, you may even see the white-robed Vestals tending the sacred fire, instructing the novices, going off in wheeled carts—perhaps the only people in Rome who dare use them—to seats of honor in the amphitheater.

Thirty years of their life the Vestals gave to the service of fire and water—they, the daughters of patricians, but the true descendants of those shepherd maids who tended the fire and watched the well while the men fought and Romulus built his wall centuries before.

As tiny girls of ten, they began their training and doubtless romped about as children will, whether embryonic priestesses or slaves, in this atrium that we can trace today (see page 598).

At twenty they began responsible service; at thirty they commenced to train the novices; at forty they might leave temple and service, if they desired, but it is not recorded that many did.

Theirs was a place of honor and privilege so long as they watched their fire and kept their vows, chief of which was chastity. If the fire went out, they were scourged by the Pontifex Maximus. If their vows were broken, they died.

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THE PYRAMID OF CESTIUS

The Egyptian pyramidal form was frequently adopted by the Romans in their tombs. To the left of St. Paul's gate, in the rear of the pyramid, is a chapel where, according to legend, St. Peter and St. Paul, on their last journey, took leave of each other. Caius Cestius Epulo, a prætor and tribune of the people, died before 12 B. C.

Over by the huge Treasury Building, which is the bitter jest of Rome, far below the pavement, are the cells where moulder through the centuries the bones of Vestals who loved not wisely nor well. With a crust of bread, a dish of wine and water, a small lamp, they went down alive into the gloom and were sealed there forevermore.

Not at first were Rome's buildings showy. The Kingdom and the Republic built, of tufa and peperino (volcanic stone), structures dull in color and small in size, and only toward the end began to coat them with stucco and adorn them with terra-cotta.

Tarquin's great temple to Jupiter was of these, its smooth stucco of marble dust, and on the roof a terra-cotta quadriga that required a fresh coat of paint each year. It was one of the gentle joys of Rome to chaff the consuls whose duty it was to apply the paint. Glistening white and brilliant red, the temple rose against

THE ROMAN PANTHEON AND ITS PORTICO

Built originally as a pagan temple, reconsecrated to Jove the Avenger, in commemoration of the triumph of Octavius at Actium—an event of as great significance for pagan Rome as was the battle of Lepanto for the Christian faith—the Pantheon became a Christian church at the beginning of the seventh century. Thanks to the researches of the antiquarians, one is able to visualize the earlier splendor of the temple—around the vast rotunda a circle of gods enshrined in their niches, among them Venus, her ears adorned with the two halves of the great pearl said to have been once the property of Cleopatra and a companion to that dissolved in vinegar at her famous supper with Mark Antony. The obelisk in the foreground came from the Temple of Isis.

THE ROTUNDA OF THE PANTHEON

Within the precincts of this historic structure repose the ashes of the artist Raphael, entombed there at his own request. Near by is the memorial slab to his sweetheart, the beautiful niece of the famous Cardinal Bibbiena. While engaged on his great works in St. Peter's and the Vatican, the Cardinal offered the painter the hand of his kinswoman, and Raphael accepted, but postponed the wedding day under pressure of work. Whether from neglect or disappointment, the bride-to-have-been sickened and died, and her epitaph, "*quæ lætos hymeneos morte prevertit*" (Whose happy marriage was prevented by death) has been called a tragic epilogue to a drama of the affections. The Pantheon is the noblest and best preserved building of ancient Rome.

Photograph by G. Frederick Atherton

HISTORY'S MOST IMPRESSIVE THEATER—THE COLOSSEUM OF ROME

In this vast amphitheater some of the fiercest gladiatorial combats of all time were held, when the Roman Empire was at the height of its glory. It had a seating capacity of about fifty thousand spectators, and was constructed almost wholly of blocks of travertine held together originally by iron cramps. At the extreme top of the wall was a narrow gallery, on which were stationed sailors from the imperial fleet, who stretched awnings over the spectators to exclude the glare of the sun.

the sky, but the rest of Rome lay low and dull and gray, so long as the Republic endured.

In the time of Sulla, Tarquin's temple was destroyed by fire, and to replace it great marble columns were brought from Greece, the first that Rome had seen. It was left for Augustus, however, to proclaim, "I found Rome brick and I leave her marble"; with the first of the emperors comes the glorious time for architecture in Rome.

In whole or in part, we have much of it today—mutilated, defaced, robbed, scorned, but yet testifying to the glory that was Rome. It varies in quality. Of three conspicuous arches, the triumphal arches that Rome loved to build, that of Septimius Severus, at the head of the Forum, is poor (see page 596); much better that of Titus, twice reconstructed, beneath the Palatine (see pages 594 and 599); very beautiful that of Constantine by the Colosseum, "The arch whereby the Christian Emperor proved himself a thief" (see page 595).

The last named was built from material taken from the Arch of Trajan, built in "Rome's golden time," which accounts, perhaps, for its loveliness. It suffered less at Christian hands than other monuments be-

cause it bore Constantine's name, and the barbarians, too, respected it, none knows why.

The Pantheon, Hadrian's tomb, which is called the Castle of St. Angelo; the Basilica of Constantine, in the Forum; the columns of Trajan and of Marcus Aurelius; fragments of city walls, of great baths, of tombs and columbaria, huge aqueducts that still serve Rome, and here and there through the city tall shafts and columns, fountains and statues, recall the names of emperors.

THE TRAGEDY OF THE TEMPLE ON THE CAPITOL

Of that last wonderful temple on the Capitol there is today no trace, though it suffered neither fire nor thunderbolt. Of glistening Pentelic marble, with roof and doors of gold, it stood from the time of Domitian to that of Charlemagne, a temple so rich that Martial cried gaily that Jupiter himself would be bankrupt when he paid for his new house, even if he sold all Olympus. Soon after, Jupiter is evicted, his day is done.

Through the centuries the temple fritters away pathetically, a bit here, a bit there. A needy emperor strips the gold reliefs from its doors, a Vandal conqueror steals half its golden tiles, a Pope (Honorius) appropriates the rest to the building of St. Peter's Church.

After Charlemagne, the hill becomes a fortress for warring nobles, the nobles who raised those beautiful towers that adorn Rome today. The stones of temple and citadel make its defenses, and later go to build the Villa Medici and the Church of Santa Maria dell' Anima.

Under the Palazzo Caffarelli, on the southern horn of the hill, the stumps of huge columns and a bit of pavement mark the temple's site.

From these fragments we can reconstruct it, glistening white and gold against the sky as it stood some fair morning centuries ago, awaiting the coming of a conqueror.

Shall it be Julius Cæsar? What matters it? But it would be appropriate. As a boy of seventeen, he served it as a priest, his thick, dark hair curling from under the wreath of shining green leaves he wore, as he mounted its steps in the pride and vigor of youth. As a man of forty, weary and worn, his head quite bald from long wearing of heavy helmet, his heart aching with the instability of friendships, he mounted the steps slowly, upon his knees, while slaves held above him the golden wreath of the conqueror and from far below came the joyous shouting of the people who would not be stilled.

Upon the northern horn of the hill, where the Temple of Juno used to stand, is the Church of Santa Maria in Aracoeli. There are many legends connected with it, but people go there primarily to see the "Santissimo Bambino," a figure of the Christ Child carved from wood from the Mount of Olives and richly adorned with jewels of every conceivable sort.

The steps which lead to the church are a memorial, like the archangel on St. Angelo, to deliverance from a plague which devastated Rome, and people used to mount them on their knees as they do today the Scala Santa (Pilate's staircase) over by the Lateran.

There are many who claim that the custom is but a survival of pagan days, of Cæsar's example at the Temple of Jupiter.

A CONQUEROR'S TRIUMPH IN ANCIENT ROME

But we are going on too fast. Let Cæsar have his triumph; no more dazzling military pageant will ever be seen in Rome.

From earliest dawn, in the valleys about the hill there has been confusion and hurrying. The victorious army had spent the night in the Campus Martius without the walls and at sunrise was knocking at the Porta Triumphalis, the gate that opened only for a conqueror. Here again historians link old and older. The Porta Santa, opened by the Pope in years of Jubilee, is a survival of this triumphal gate.

The citizens, clad in festal garments, are crowding the hills about the route; the priests stand waiting at their temples, garnished for the day, those of Janus especially jubilant.

The sounds of shouting, of singing, of trumpets and lutes, come between the hills; the long train is winding its way along the river and around through the great Circus Maximus, there where un-

Photograph by Emil P. Albrecht

THE FOUNTAIN ON THE JANICULUM

From the time of Trajan, Acqua, or Aqua Trajana, has been brought to Rome from the Lago di Bracciano, thirty miles distant. Four aqueducts convey to the city a supply of water equal to 110 gallons per capita per day, there being twelve great fountains, sixteen smaller ones, and more than three hundred public conduits that flow continuously into stone watering-troughs.

Photograph by Emil P. Albrecht

THE FONTANA DI TREVI

With a flow of more than seventeen million gallons of water a day, the Fontana di Trevi is the most magnificent of the public fountains in Rome. The central niche has a figure of Neptune, and at either side are figures of Health and Fertility, in front of a large stone basin. It is customary for the traveler leaving Rome to drink deep from this fountain by moonlight and throw a coin in the basin, in the belief that his return is thus assured. The street urchin, fishing in the clear waters the next morning, profits by the tradition.

IN THE CENTER OF THE SQUARE OF THE CAPITOL IS THE FAMOUS EQUESTRIAN STATUE OF MARCUS AURELIUS

The statue, which is of bronze, owes its excellent state of preservation to the popular belief in early times that it was a statue of Constantine, the first Christian emperor. To the left and right of the statue are the Capitoline Museum and the Palace of the Conservatori, or town council.

PIAZZA DEL POPOLO

Named for the extensive grove of poplar trees that surrounded the Mausoleum of Augustus, Piazza del Popolo is the largest and finest square in Rome. In the center of the square is a magnificent Egyptian obelisk of red granite with four marble lions at the base, from the mouths of which issue copious streams of water. This obelisk was erected in the Circus Maximus in 10 B. C., to commemorate Octavius' defeat of Antony and Cleopatra, and was dedicated to the sun. It was moved to its present position in 1589.

Photograph by A. W. Cutler

FLOWER VENDERS ON THE STEPS LEADING TO PINCIO GARDENS

picturesque gas-works cluster today, between the Palatine and Aventine hills.

It turns in that meeting of little valleys where the ruins of the Colosseum now tower high, where Nero's great lake and Golden House once dazzled the eye, and comes up under the shadow of the Palatine Hill to the many crowded buildings of the Forum, to the Sacred Way that leads to the stately temple on the hill.

First the senators, heads of great Roman houses; then trumpeters, and after them the spoils of war—armor, banners, silken stuffs, household gear, statuary, fragments of buildings, the fruit of home and temple and army, the treasure of fallen cities and conquered states, borne aloft by slaves or heaped in carts—a long, long train passing one by one that all might see what had been brought to Rome.

Then oxen, the beautiful white oxen, with wide-spreading horns, which we see today on the Campagna. Each one is brushed until he shines; his horns are gilded and tied with ribbons, for he is a sacrifice to Jupiter this day.

Then the priests, all glittering, and possibly some strange animals—lions, elephants, camels—from far conquered lands.

Then troops of prisoners destined to slavery or, in later days, to death in the Colosseum; after them the personal spoils of the foe—his war-chariot, throne, shield, drinking-cup, his crown held high, his wife's jewels in precious vases and urns, his golden plate—and the man himself, walking bare-footed, in chains, unkempt, ragged, forlorn, a captive king.

So walked Jugurtha in the triumph of Marius; so Vercingetorix before Julius Cæsar; so Zenobia, conquered by Aurelian. Small wonder that Cleopatra preferred self-given death!

THE CONQUEROR IN HIS CHARIOT

When all are gone comes the conqueror, preceded by lictors and musicians. In purple toga gold-wrought, carrying a laurel branch and ivory scepter, he stands proudly in his high chariot, its horses four abreast, as in Jove's quadriga, receiving the acclaim of his fellow-citizens. About him are his children, the tiny ones even in the chariot; and there, too, two slaves, one of whom holds above his head the golden wreath that belongs to Jupiter,

while the other, lest his head be turned, whispers constantly, *"Hominem te memento"* (Remember, thou art a man).

After the conqueror the legions who fought for him, the soldiers, true sons of Romulus and Mars, who carried the Roman eagles beyond the Mediterranean, over the Alps, whose rhythmic footfall resounds for all time on the roads they laid. By thousands they come, shouting, singing, rejoicing; for this day they had endured privation, hard march and scanty rest; for this day they had suffered and striven, for it some had died. Cæsar did not triumph alone; theirs, too, was the glory.

The spoils are heaped in great mounds about the hill; the slaves are collected; the great captive goes to that hideous underground prison, old almost as Rome (the Tullianum or Mamertine Prison), to die more or less quickly; the victor leaves his chariot and slowly mounts the hill.

The legions go to their camp outside the wall, the people scatter, and in the coming dusk the conqueror of the world kneels to give back unto the king of gods and men the golden laurel he had worn a little while.

Photograph by Victor Cushman

DAUGHTERS OF ROME, THE MOTHER OF CIVILIZATION

THE DAYS OF TRIUMPHS VANISH

The days of Triumphs vanish, the sound of shouting dies, the Roman eagles cease to soar, the golden laurel dims. After Constantine leaves Rome for his Eastern capital, the Empire wanes.

Hunted, hidden, despised, tortured, martyred, but steadfast, eventually the Christians peacefully conquer Rome. Many are the beautiful stories told of them, stories that are our common heritage. It is a pity that the poor taste and superstition of the Middle Ages should so have twisted and turned and overadorned them that we turn from them disdainfully today. Because of their incredibly mystic or miraculous trappings, we will none of them, losing the beautiful, dignified truth beneath.

Rome has so many legends, so many stories, and under their picturesque surface is ever a solid stratum of reality. Some of the stories are pretty, but more ugly; some are sweet and sad and some bold and brave; some are sordid and mean beyond telling; occasionally one is amusing, but more often they are bitter and

Photograph from Arthur Stanley Riggs

THE ITALIAN "WHITE HOUSE"—THE QUIRINAL—AND THE KING'S BODYGUARD

The Quirinal is one of the largest palaces in Rome. It was formerly the summer residence of the Popes and the place in which the conclaves were held for the election of the Supreme Pontiff.

cruel beyond all conception, and, to our shame, not the least cruel are told of Christian men.

Every stone in Rome, had it a tongue, would cry in agony; every one is blood-stained. Bright, modern city as it is, it is built on and of the ruins of its predecessors; it carries their heritage of joy and woe.

It is not worth while to torture ourselves with details of the sacrifices whereby the Christian faith won Rome. We know from the lips of the pagan Seneca how bravely the martyrs died: "What are your sufferings compared with the flame and the rack? And yet, in the midst of sufferings of that sort, I have seen men not only not groan, that is little; not only not complain, that is little; not only not reply, that, too, is little; but I have seen them smile and smile with a good heart."

THE BEGINNING OF THE PAPAL STATES

The sacrifices pass, the emperors grow feeble, the world accepts the Christian faith, the bishop of Rome becomes a mighty power. At first the rule is spiritual alone, the kingdom is not of this earth; at first he is only a gentle teacher promising eternal joy. The years go on; he is more a ruler, less a priest. The ancient kings of Rome were also Pontifex Maximus (High Priest); the Pontifex Maximus now will be a king.

We find a Roman prefect offering to become a Christian if he can thus be made bishop of Rome; we get a glimpse of his power. Later another prefect does embrace Christianity, becomes monk and pope (Gregory the Great), and forbids other bishops to be known as pope (papa), as had been customary. He fixes the ecclesiastical supremacy of Rome.

Over the Alps comes again and again the Gothic invader.

There is constant trafficking and bargaining, much dissolute living and open crime. Rome, from a city of over a million inhabitants, goes down through the ages until she has scarcely a thousand; until her temples and churches, her great basilicas and palaces, lie ruined at the foot of her hills.

With the fifteenth century she begins to revive and, although there is still constant strife before her, she attains a prosperity as the seat of Christ's Vicar she could not know as a political power. Pilgrims come from afar to her shrines, royal penitents seek peace and grace there, and each leaves rich gifts on her altars and in her hospices.

WHEN POPE AND PATRICIAN WERE RIVALS IN ADORNING THE CITY

This is a time of building, and from it are the many great churches, the beautiful piazzi, the palaces to which we go today. They are much changed, restored, altered, but they speak to us of the Rome of the Middle Ages and of the Renaissance, the day when pope and patrician rivaled each other in adorning their city. That was a day of luxury almost as great as in the time of Imperial Rome, but more cautious. An amusing story may illustrate it.

Leo X, patron of art, was frequently in his banker's debt. This banker, Agostino Chigi, was of kindred tastes, but longer purse, and they were the best of friends. Chigi invited the Pope one day to a banquet in his pergola by the Tiber, and as each course was finished the gold and silver plate on which it was served was tossed nonchalantly over the wall into the river.

The Pope's eyes grew big, but there was nothing to be said or done; he could not hope to equal his rival here.

The supper ended, the Pope and his train departed; Chigi's servants lifted the silver platters, the golden urns and goblets, from the net in which they had been caught!

Of all these popes, Sixtus V in his brief five years did most for the Rome we know, leaving her as she remained until 1870, when a great increase in population (it is now about 600,000; in 1870 it was not half that) and a new era of building began.

THE BRIDGES OF THE TIBER

We must cross the river and we have choice of many bridges (twelve, I think), but the two most popular are the Ponte Palatino, for its view of the Ponte Rotto and the island, and the Bridge of the Angels, leading to the Castle of St. Angelo and the Vatican (see pages 601 and 602).

A CONTINGENT OF THE SOUTHERN ITALIAN POPULATION TAKES ITS EASE IN THE SUN

At the turns the river spreads in shining reaches that reflect sky and cloud, palace and dome; but at other points it runs sullenly between its walls and is never to Rome what the Thames is to London, the Seine to Paris, a servant, a lover, and a friend.

There is no least trace of the Sublician bridge, the one wooden bridge bolted with bronze, so readily destroyed when danger threatened from the Janiculum. Thence it was that Lars Porsena came, and "brave Horatius" with two comrades held this bridge against the whole Etruscan army.

The river can tell you many such a tale, and of the Castle of St. Angelo more than a few—of Theodora the Senatress and her yet more evil daughter, Marozia, who held it; of Cellini and Cenci and many another who suffered and died here or in the square at the other end of the bridge.

THE VICTOR EMMANUEL MONUMENT

From the Pincio we look straight down the Corso to Victor Emmanuel's great monument, reared against the Capitoline Hill (see page 625).

A popular American lecturer advises his hearers "to think in big figures." That advice has ever been totally superfluous in Rome. Her circuses, her Colosseum, her palaces, her triumphs, her banquets, were the biggest of their kind; her temples were huge, her churches the largest in Christendom. Modern Rome's Palazzo delle Finanze covers thirty thousand square yards, "the largest treasury in Europe for the least treasure"; this great, expensive monument to Victor Emmanuel II is the largest of its kind in the world.

It seems out of place there, against the Capitoline Hill. But, then, everything is out of place there. The saddle between the two horns is a magnificent square, the Piazza del Campidoglio (see page 610). At right and left are palaces, the Capitoline Museum and the Conservatori, while across the end stretches the Palazzo del Senatore, shutting out all view of the Forum, which was nothing but a quarry when the palace was erected, in 1150.

On the sunny pavement of the piazza Marcus Aurelius rides his bronze horse commandingly. Of all the many equestrian statues of ancient Rome, this alone survives, Christian Rome accepting it as a portrait of Constantine, respecting it when Roman marble was being burned for lime and ancient bronze was being melted down.

Michael Angelo set up the statue here (1538), bringing it from the piazza of the Lateran.

But this square is too modern for such ancient memories. What one sees here is Rienzi, a fallen idol, waiting a full hour for the people to strike him down. Now he also has a bronze statue in the pretty garden on the hill.

WHAT SIXTUS V DID FOR ROME

In the square below us, as we loiter on the Pincio, is a great obelisk, and that brings us back to Sixtus V and his services to Rome.

Not a few of Rome's great piazzi, which add so much to her attractiveness, are the more beautiful because of his thought. He repaired, he restored, he tore down, he built up; to him we owe the Lateran Palace of today (a museum), the marble staircase of the Piazza di Spagna, the Acqua Felice, the Dome of St. Peter's.

He it was who moved the "Horse Tamers" to their present position and set up fountains and obelisks in the squares of Rome. One obelisk, that of Rameses III, brought by Augustus to Rome, is in the Piazza del Popolo at our feet, its hieroglyphs yet visible, taking us back three thousand years (see page 611). Another, from the Basilica of Constantine in the Forum, is in the Piazza dell' Esquilino before Santa Maria Maggiore, the greatest of the eighty churches dedicated to the Virgin in Rome. Our Lady of the Snows is her older and prettier name, commemorating the legend of her foundation, an August snowfall—a story told me first in a church far beyond the Alps, in the open German plain.

Another obelisk is near San Giovanni in Laterano, the oldest and largest in Rome, perhaps in the world. It is of red granite, 105 feet high (with pedestal 154 feet), and was first erected by Thothmes III 1436-27 B. C. What an upstart Rome is, to be sure! Constantine brought the monolith to Rome to adorn the Circus Maximus, possibly to mark the goal of

Photograph from Arthur Stanley Riggs

THE DOME OF ST. PETER'S FROM AVENTINE HILL

The highest and most picturesque hill in Rome, the Aventine, is said to have been the place where Peter and Paul taught the Christian faith. In early times it was the hill of the plebeians, who retired to its heights in their controversies with the patricians.

Photograph by A. W. Cutler

NEWSBOYS DREAMING OF THE SPLENDOR OF THE PAST

the chariot-races. Now it stands in the silent, sunny piazza before the church, still speaking of Egypt, although sixteen centuries in Rome.

THE FIVE PATRIARCHAL CHURCHES OF ROME

The Church of St. John, or San Giovanni, is one of Rome's five "patriarchal" churches of which the Pope is direct head and to whose congregations all Christians throughout the world once were accredited. They have always been greatly venerated and, along with Santa Croce and San Sebastiano, above the catacombs of the Via Appia, form the "seven churches of Rome," better known to pilgrims than the far-famed seven hills. They are still the notable churches of Rome, the stateliest, richest, and holiest, although the Pope comes to them no more. Besides St. John, they are St. Paul and St. Lorenzo, both without the walls, St. Peter's and Santa Maria Maggiore.

St. John, like the other great churches, was founded by Constantine to please Saint Sylvester, then bishop of Rome. It occupied the palace of the Laterani family and for all time wedded pagan name to Christian saint.

From its foundation until the popes went to Avignon, it was the Papal residence. Upon the return to Rome, in 1377, Gregory XI took up his residence at the Vatican and, although Sixtus V rebuilt the palace, none has since dwelt here, although many are buried in the church.

The great bronze central doors came from the Curia, the Senate-house of early Rome. Look closely and you will see that they are pieced to fill their present position at the end of the long nave.

The door at the extreme right is closed. That is the Porta Santa, which opens only every twenty-five years.

BURIAL PLACE OF THE HEADS OF ST. PETER AND ST. PAUL

The church is stupendous and the cloisters marvelously lovely. Its many visitors are of two sorts—the art-loving and the devout. One group lingers long before its treasures; the other prays long before its shrines, the chief of which contain the heads of Saints Peter and Paul.

St. Paul's body, after transfers to and from the catacombs, rests in his great glittering church without the walls, where he was first buried, and St. Peter's in the cathedral that covers his original grave.

It has long been the habit to dismember saints, popes, and royalties. Hearts, heads, and various other intimate properties were enshrined separately all through the Middle Ages, and it takes nothing from the merit of St. Paul's or St. Peter's that their saints are headless, while it gives much to St. John's.

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PIUS XI IMPARTS A BENEDICTION AFTER HIS CORONATION

Over the central entrance to St. Peter's is the loggia, where the Pope is seen wearing the triple crown, which is emblematic of the triple dignity of teacher, lawgiver, and judge. The decorative banner is emblazoned with the coat of arms of Pius IX.

Wide World Photograph

CARDINAL BISLETI ANNOUNCES THE NAME OF THE NEW POPE

On February 6, 1922, Cardinal Gaetano Bisleti announced to the waiting throngs before the loggia over the main entrance to St. Peter's that Cardinal Ratti of Milan had been elected as the successor of Benedict XV and had chosen the name of Pius XI.

Photograph by A. W. Cutler

IN A SUNLIT ROMAN COURT

But we are forgetting Sixtus V, the "strong man" of his time, "the one man who is worthy of my hand," quoth Queen Elizabeth. There is much we are forgetting. We have not climbed the Scala Santa, the twenty-eight marble steps from Pilate's palace at Jerusalem, where Luther heard the voices declaring, "The just shall live by faith"; nor seen at the top the Sancta Sanctorum, the private chapel of the popes, which remains from the palace of 1278.

We have not been to the Palazzo del Quirinale, built for a summer residence for the popes (1574) because the hill was higher and airier than the low Monte Vaticano, and, since 1870, the residence of the King (see page 614).

We have slighted the museums and galleries, the great palaces and gardens; we have bought no flowers by the "Spanish Stairs," nor watched the urchins turning cart-wheels in the hope of *soldi*.

We have given no thought to the great monastic orders nor their influence on Roman history.

WHEN ROME OUTWITTED THE CENSOR

We have not asked Pasquino's opinion on political questions of the day, but if dispatches are being censored he is sure to have one. He and Marforio, the river-god, held long satirical dialogues in the days of overcensored Rome. He is the fragment of an ancient marble group by the Palazzo Braschi. Tradition says a tailor gave him his name.

The ironical epigrams were pasted on the marble, and in less than a day, possibly an hour, an answer appeared on Marforio, yet none saw them arrive.

The popes were often pilloried thus, and some of them wanted to throw the statues in the Tiber, but did not dare.

Marforio is now in the Vatican and presumably silent — but how lonely! When Napoleon carried off Pius VII to Paris, Pasquino said, *"I Francesi son tutti ladri"* (The French are all robbers), and Marforio replied, *"Non tutti, ma Buona-parte."* (Not all, but a good part.)

A VISIT TO ST. PETER'S

We have not been to St. Peter's, but we can see it from here, its great dome floating in the blue. Go nearer it if you will; learn the meaning of its bigness, of your own insignificance (see page 624).

The great colonnades reach out their arms to inclose you, the fountains toss

their spray in air to carry your thoughts to the sky. The great façade looms ponderous, overpowering before you, hiding its glorious dome. The tall obelisk beside you seems but a walking-stick for size.

The obelisk has a longer history than the church that dwarfs it, which, men say, prompted Sixtus V to set it here. It was brought from Heliopolis by Caligula; it was set in Nero's circus here, on the Mons Vaticanum; it has witnessed pagan games, Christian tortures, St. Peter's burial; its base has been soaked with martyrs' blood.

It stood or lay for centuries near the present sacristy and was brought upright to its present place, a distance of about 1,000 feet. Michael Angelo had told Paul III that to move it was impossible; Sixtus V did not recognize the word. To a young architect, Domenico Fontana, he granted unlimited means and power; then he sat back and waited. What pagans had done sixteen centuries before, Christians should do for him.

Fontana came at last and said that he was ready. Beams, irons, ropes, horses, men, and all Rome were waiting in the square. Would the Pope bestow his blessing on the work? The Pope thinks that can wait. A scaffold has been set up in the piazza; if Fontana does not succeed he will die there. Sometimes a hint seems more effective than a benediction.

THE STORY OF THE RAISING OF THE OBELISK

The people are hushed to silence under penalty of death. Fontana's sharp commands are heard. Nine hundred men and a hundred horses begin their work. The ropes grow taut; the column rises. Then it sticks, will not move; the strain is intense.

In the silence a hoarse voice shouts, "Water! water on the ropes!"

The hint is taken—the "Needle" goes home! And a sailorman has won for San Remo, his birthplace, the right to supply palms for St. Peter's service on Palm Sunday to this day.

Within, the church seems larger than without; a thousand people are lost in it and fifty thousand do not fill it. Its proportions are beautiful and its effect imposing. It is the largest church in the world, but it is not for me the most beautiful. In spite of the constantly succeeding services, it makes more the impression of a monument than a house of prayer. Constantine the Great founded it; Sylvester I consecrated it, in 326, over the grave of St. Peter in the circus of Nero. Its foundations are laid in blood-soaked soil.

Photograph by A. W. Cutler

YOUTHFUL FLOWER MERCHANTS IN THE SHADOW OF THE COLOSSEUM

In the fifteenth century a reconstruction became necessary and for two hundred years the work went on intermittently. On November 18, 1626, the 1300th anniversary of St. Sylvester's consecration, Urban VIII consecrated the new work.

Fra Giaconda, Raphael, Bernini, Michael Angelo, Bramante, Sangallo, Ma-

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AN AËRIAL VIEW OF ROME

To the left of center the magnificent St. Peter Basilica stands out with startling clearness; directly before it is St. Peter's Place, and to the right are the famous Vatican Palaces and Gardens.

© Elmendorf, from Galloway

ITALY'S GREATEST MODERN MEMORIAL, THE MONUMENT TO VICTOR EMMANUEL II

On the southern side of Piazza di Venezia, the tramway center of Rome, is the imposing monument to Victor Emmanuel II. Approached by massive flights of steps, it rises to a height of 200 feet from the center of a colonnaded platform. The monument cost $5,000,000 and was under construction for 25 years. The statue of the first king of modern Italy and that of General Grant (unveiled in Washington on April 27 of this year) are within a few inches of the same size and are said to be the largest equestrian statues in the world.

derna, all labored there; it represents the flower of Roman art in that time.

There is more of their work in the adjoining palace, the "house of a thousand rooms," in one corner of which His Holiness the Pope dwells. The rest is given over to museums and galleries. The palace covers thirteen acres, of which six are in courtyards, large and small, and behind it are beautiful gardens which one may not enter.

GHOSTS OF ANCIENT ROME

The sun goes slowly down behind palace and church.* The Pincio still lies in the light, but the violet shadows lengthen stealthily. Out of them come trooping, with the darkness, a host of memories, ghosts of ancient Rome.

Nero's uneasy spirit walks nightly in the Piazza del Popolo, finding no rest in his grave. Messalina, of evil memory, haunts the gardens of the hill where she was slain.

In the dusky streets, stretching away from us on every side, sandaled or booted footsteps resound softly, the patter of that host whose names illumine history, coming toward us down the centuries: Cæsar and Pompey, Scipio and Hannibal, Trajan and Marcus Aurelius, Ste. Cecilia and St. Paul, Constantine, Alaric, Charlemagne, Gregory, Petrarch and Tasso, Borgia and Cenci, Colonna and Orsino, Luther and Galileo, Rienzi, Titian, Loyola, Palestrina, Napoleon—an endless procession—emperor, conqueror, poet, artist, saint or martyr, each with a claim on fame.

The Pincio, the "Hill of Gardens" in Lucullus' time, became under Napoleon (1809-14) a beautiful pleasure ground. For a century fashionable Rome came here toward sunset to drive slowly in great circles, listen to music, and pay each other visits, while the less wealthy Romans loitered afoot on the terrace to gossip and to watch the show (see p. 612).

Gossip there was a-plenty, jesting, soft laughter, and more or less flirting, no doubt, for in the carriages, well chaperoned, of course, were to be seen the fairest faces of Rome. And not only the beauties, all the celebrities were there—the greatest statesmen, the soldier-idol of the moment, the most popular cardinals resident in Rome—receiving graciously the salutations of their admirers, the murmured applause of the crowd.

*St. Peter's façade looks to the east, not to the west, and its priests face the congregation across the altar.

THREE YEARS AFTER THE WAR

Then came war and changes. Soldiers, priests, statesmen hastened to their duties; ladies, old and young, to service in hospitals, workrooms, soup-kitchens.

Now, after three and a half years of warfare and three and a half of peace, bitter even to victors, the old custom resumes sway. But is the sunshine as bright, the laughter as gay? Eyes that see through tears see shadows everywhere, and who can laugh wholeheartedly when so much youth lies dead?

Another generation must grow up, another generation which has not witnessed the devastation of Italy's great plain, which has not lost father or husband, brother or lover, on some distant battlefield or, worse yet, seen them come home from prison-camps only to die miserably.

Like all other nations engaged in the World War, Italy had her share of all its miseries and its aftermath.

Like all others, she had her share of those ignoble souls who profited ghoulishly upon their country's necessities and her children's lives.

Like them, she has had—more than most, perhaps—her labor troubles, her sporadic revolutions against law and order, her misled patriots, her willful mischief-makers; has had to listen in helpless anxiety to the wails of the hungry, the outcry against rationing of foods, the ever-increasing prices of necessities, and the ever-depreciating purchasing power of her money.

It is a very different Rome that walks today upon the Pincio—walks because few have money for carriages or motors, as of old—a Rome that no longer "takes memories for hopes," but looks gravely into a future stern and grim, but at length giving promise of coming sunshine.

Italians are industrious and frugal. Harvests in times of peace are usually bounteous. Some bitter lessons there yet may be to learn before the sun shines radiantly; but, if all Rome desire it ardently, there shall arise a city which will far outshine the glories of the old and irradiate all Italy.

Photograph by Morgan Heiskell

ON THE DISTANT SUMMIT RISE THE RUINS OF VILLA JOVIS: CAPRI

Here Tiberius, the stepson and successor to Augustus Cæsar, spent the last ten years of his eventful life. Beyond the height crowned by the villa walls may be seen the Sorrentine Peninsula of the Italian mainland.

Photograph by Morgan Heiskell

A PIPER OF CAPRI, THE ISLAND OF THE SIRENS

This musician and his fellows come to Capri from the mountains of the mainland at Christmas time to play before the shrines and in the houses of the islanders. Theirs is a hereditary calling that is fast dying out.

Photograph by Morgan Heiskell

THE CASTIGLIONE AND THE CLIFFS OF MONTE SOLARO

The "Castiglione," or castle, on the peak in the middle distance, was one of the strongholds of the English under Colonel Hudson Lowe (afterwards jailer of Napoleon at St. Helena), who allowed the island to be wrested from him by the French in 1808.

Photograph by Morgan Heiskell

THE GARDEN OF A CAPRI VILLA

Probably in no one spot in the world has Nature been more lavish than on this island at the Mediterranean gateway to Naples. Within its limited space there are some 800 species and 300 varieties of indigenous plants.

Photograph by Morgan Heiskell

CAPRI FROM THE HEIGHTS OF MONTE SOLARO

Viewed from Naples, Capri is a conspicuous object in the seascape twenty miles to the south (see "The Isle of Capri," by John A. Kingman, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1919).

Photograph by Morgan Heiskell

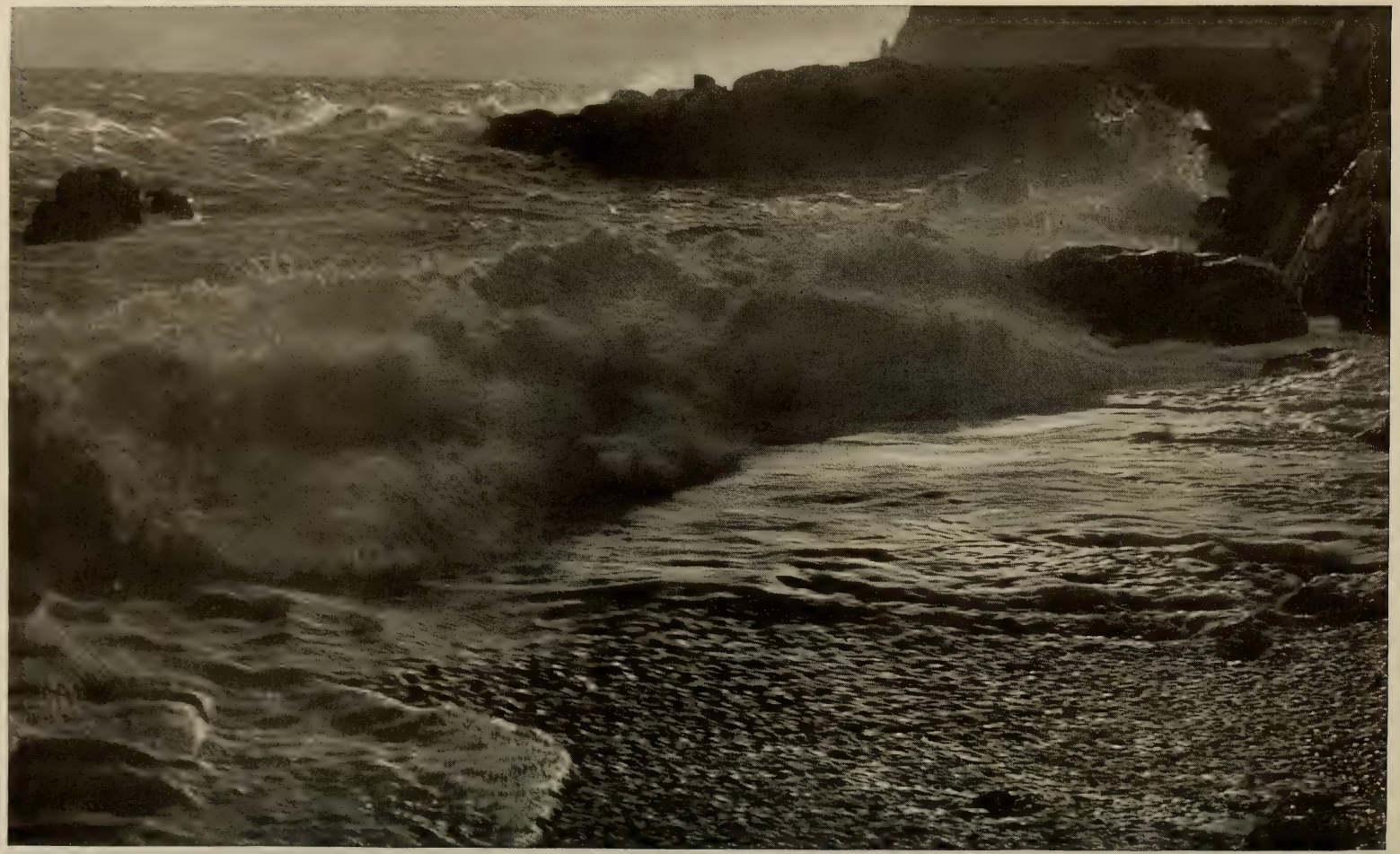
SIREN HAUNTS

He who would escape the lure of Capri should bandage his eyes rather than follow the practice of the ancient Greeks, who sealed their ears with wax lest they hear the song of the Sirens of this enchanted isle.

Photograph by Morgan Heiskell

A CAPRI TERRACE

Overlooking the old Certosa monastery, founded in the fourteenth century. In the background are the Castiglione and the cliffs of Monte Solaro, which rise abruptly from the sea to a height of 900 feet. The mountain itself has an altitude of 1,920 feet.



Photograph by Morgan Heiskell

THE FABLED ROCK FROM WHICH THE SIRENS SAW "THE WINGED GALLEY" BEAR ULYSSES SAFELY BY

Photograph by Morgan Heiskell

A MODERN SIREN OF CAPRI

Photograph by Morgan Heiskell

A PROCESSION DURING THE FEAST OF SAN COSTANZO, THE PATRON SAINT OF CAPRI

Photograph by Morgan Heiskell

A VISTA OF SNOW-CAPPED VESUVIUS THROUGH A TRIPTYCH OF STONE PINES

Photograph by Morgan Heiskell

A GARDEN OF PINES ON A CAPRIAN HILL

The stone pines (*Pinus pinea*) are a characteristic feature of the island.

A MEMORIAL TO PEARY

The National Geographic Society Dedicates Monument in Arlington National Cemetery to Discoverer of the North Pole

AHISTORIC ceremony, of especial interest to members of the National Geographic Society, took place at Arlington National Cemetery April 6, 1922, when a memorial erected by the Society at the grave of Rear-Admiral Robert E. Peary, U. S. N., was unveiled upon the thirteenth anniversary of Peary's discovery of the North Pole.

Not since the Armistice Day funeral of the unknown hero, who is buried at the entrance to its amphitheater, has such a notable assemblage been present at Arlington as that which honored the man who reached the top of the world, goal of intrepid Arctic explorers for many centuries.

This gathering included the President of the United States and Mrs. Harding, William Howard Taft, Chief Justice of the United States; the Secretary of State and Mrs. Hughes; Edwin Denby, Secretary of the Navy; Col. Theodore Roosevelt, Assistant Secretary of the Navy; the Ambassador of France and Mme. Jusserand, and members of the Board of Trustees of the National Geographic Society: Alexander Graham Bell, John Joy Edson, Charles J. Bell, David Fairchild, C. Hart Merriam, O. P. Austin, George R. Putnam, George Shiras, 3d, Col. E. Lester Jones, Grant Squires, Rear-Admiral C. M. Chester, Frederick V. Coville, Rudolph Kauffmann, T. L. Macdonald, S. N. D. North, John Oliver La Gorce, J. Howard Gore, George Otis Smith, O. H. Tittmann, Henry White, and Stephen T. Mather.

In the audience also were members of both houses of Congress, Major General John A. Lejeune, Commandant of U. S. Marine Corps; Brigadier General David L. Brainard, of the Greely Expedition, who with Lockwood in 1882 won the record of the farthest north, previously held by Great Britain for 300 years; Admiral R. E. Coontz, Rear-Admiral Cary T. Grayson, Rear-Admiral W. A. Moffett, Rear-Admiral W. L. Rodgers, Rear-Admiral T. L. Latimer, Rear-Admiral John S. Carpenter; Rear-Admiral L. E. Gregory, Rear-Admiral M. T. Endicott, and Capt. R. E. Bakenhus, representing the Bureau of Yards and Docks, Peary's own corps in the Navy (formerly the Civil Engineer Corps); Rear-Admiral George W. Baird; a Masonic delegation from Kane Lodge of New York City, and many other government officials, explorers, distinguished representatives of scientific organizations and universities, together with hundreds of prominent citizens of the Nation's Capital and friends of the discoverer of the North Pole who came from distant cities.

Companies of bluejackets, marines, and infantrymen, under the command of Capt. T. S. Brand, of the 64th Infantry, formed a hollow square around the memorial during the exercises.

Dr. Gilbert Grosvenor, President of the National Geographic Society, presided and made the introductory address. The Secretary of the Navy, Edwin Denby, and the Assistant Secretary of the Navy, Theodore Roosevelt, whose family name was borne by the vessel used by Peary in his Arctic voyage, paid high tribute to the explorer. The Rev. Dr. Charles Wood offered the invocation.

THE EXPLORER'S DAUGHTER UNVEILED THE MONUMENT

Mrs. Edward Stafford, daughter of Rear-Admiral Peary, drew aside the Union Jack which veiled the memorial, as the United States Marine Band played the National Anthem. While the distinguished company stood with bared heads, she slowly hoisted, upon a flagstaff near by, the historic silken Stars and Stripes which her father carried wrapped about his body and unfurled at the North Pole to signify that an American was the first to attain it. She was escorted by her brother, Robert E. Peary, Jr.

Mrs. Robert E. Peary, companion of her husband on several of his Arctic ex-

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AT THE MOMENT OF THE UNVEILING OF THE PEARY MEMORIAL IN ARLINGTON NATIONAL CEMETERY, ON APRIL 6, 1922

On the platform from right to left: The Secretary of State and Mrs. Hughes; William Howard Taft, the Chief Justice of the United States, who was President of the United States when the North Pole was discovered, and upon whose recommendation to Congress the explorer was created a Rear-Admiral; the Ambassador of France and Mme. Jusserand, Dr. Gilbert Grosvenor, President of the National Geographic Society; the President of the United States and Mrs. Harding, Mrs. Robert E. Peary, Dr. E. W. Nelson, Captain Robert A. Bartlett, Edwin Denby, Secretary of the Navy, and Rev. Dr. Charles Wood. Partly concealed by the flag (at the right) is Colonel Theodore Roosevelt, Assistant Secretary of the Navy.

peditions, was the guest of special honor at the ceremonies.

Captain Robert A. Bartlett, explorer and navigator, companion of Peary upon his triumphant expedition, brushed away tears as speaker after speaker paid tribute to his beloved chief. Another figure of interest was Matt Henson, Peary's faithful aid, the only man beside his leader and four Eskimos who has stood at the apex of the world.

THE ADDRESS OF GILBERT GROSVENOR, PRESIDENT OF THE SOCIETY

Dr. Grosvenor, in his introductory address as presiding officer, said:

"On a late summer day in 1891, Peary's ship, the *Kite,* was working its way through the ice-fields off the Greenland coast, seeking an anchorage, when a cake of ice became wedged against the rudder, causing the wheel of the old ship suddenly to reverse and one of the spokes to pin Peary against the casement. Before he could be released both bones in his left leg had snapped.

"What should he do after this distressing accident? Return to Washington, as his companions urged him, and come back to Greenland later, when his badly broken limb had healed? 'No,' said Peary, 'my friends have invested their money in my enterprise and I must make good to them *now.*'

"So the surgeon strapped the leg to a board, and on an improvised stretcher he was carried ashore and deposited on that bleak, desolate land, while by his command the ship and surgeon hurried home lest the entire party should be caught in the ice unprovisioned for the long winter.

"Thus, strapped to a board, Peary began his first campaign in the Arctic.

"Many in this notable gathering have heard Peary declare, as he loved to so often, that 'Mrs. Peary always seemed to foresee whether she could help most by going north with the expedition or by staying behind to speed the auxiliary parties.'

"Fortunately for American history, her intuition had impelled her to accompany her husband on this, his first expedition, in spite of the fact that no white woman had previously wintered with an Arctic party. She nursed him so skillfully that at the Christmas games arranged for the Eskimo he outraced on snowshoes not only all the natives, but also his own men.

"The following spring he ascended to the summit of the great ice-cap which covers the interior of Greenland, 5,000 to 8,000 feet in elevation, and sped northward for 500 miles through a region where the foot of man had never trod before, in temperatures ranging from 10° to 50° below zero. This sledding journey of 1,300 miles round trip, made in less than ten months after his leg was broken, in boldness of conception and brilliancy of results is unsurpassed in Arctic history.

EXTRAORDINARY COURAGE MATCHED BY REMARKABLE INTELLECT

"Peary's extraordinary courage was matched by an equally remarkable intellect. He possessed the resourcefulness and patience in detail of the inventor, the precision of an engineer, the generalship of a great commander. Every campaign was planned with such minute care that though he took hundreds of men north with him, he brought them all back safely, with the exception of two who lost their lives in accidents for which the leader was in no wise responsible.

"It was inevitable that the prize for which all nations had striven for many centuries should be won by such a combination of pluck and brains.

"We are proud to recall that Peary was a member of the National Geographic Society from its organization, in 1888. His first address to The Society, describing a journey of exploration through Nicaragua, was given in that year and published in the first volume of The Society's proceedings. On his return from the north, his first public address was always made before our Society. His last public appearance was on the platform of the National Geographic Society, when he came to the meeting, in spite of his doctor's orders, to present Stefansson in 1919, just returned from six years in the north; his last article was written for The Society's Magazine, and the last photograph of him was taken on the steps of The Society's buildings.

"He was ever an ardent supporter of The Society's ambition to enlist the interest of every man and woman in scientific work and of The Society's earnest

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THE SECRETARY OF THE NAVY VOICING THE NATION'S APPRECIATION OF THE ACHIEVEMENTS OF REAR-ADMIRAL ROBERT E. PEARY

efforts to promote international acquaintance and friendship by making geographic knowledge intelligible and attractive to all persons. No member was more enthusiastic than he, nor pushed harder to increase its numbers, nor took greater happiness in helping it grow to more than 700,000 members.

"When he retired from active exploration he accepted election to The Society's Board of Trustees.

"We may recall in humble pride that The Society, in Peary's kind estimation, did all that it could to advance his work and sustain his efforts. Every honor that The Society could bestow was also his. He was elected one of its six honorary members in 1903; the Hubbard Gold Medal was presented to him on behalf of The Society by President Roosevelt in 1906 for his Farthest North, and in 1909 a Special Gold Medal, four inches in diameter, celebrating the discovery of the North Pole, was struck off in his honor and presented to him.

"I voice the feeling of every member of this great organization when I say to Mrs. Peary that our hearts are filled with inexpressible tenderness and gratitude that the precious privilege of placing this monument at his resting-place has been granted by her to the National Geographic Society, which loved him so well, and which with all the world rejoices that he 'made good at last,' and that an American has become the equal of Hudson, Magellan, and Columbus."

THE SECRETARY OF THE NAVY'S ADDRESS

The Hon. Edwin Denby, Secretary of the Navy, spoke as follows:

"The discovery of the North Pole by Civil Engineer Robert E. Peary, U. S. N., on April 6, 1909, was a supreme achievement in courage, endurance, and tenacity of purpose. His victory will stand forever as a paramount example of the conquest of spirit over matter.

"When the dispatch, 'Stars and Stripes nailed to the North Pole,' went flashing through the crisp Labrador air from the wireless station at Indian Harbor, all the civilized nations were thrilled with surprise and interest by the wonderful news; but those who had studied the history of Arctic exploration in the past three hundred years, and had followed Peary in his twenty-three years of brutal hard labor, with cold, hunger, and darkness, blinding snow and dazzling Arctic light, with terrific wind and impassable water and probable death before him, thanked God that the will of this man had proved stronger than the forces of nature.

"For twenty-three years, through discouragement and opposition, and by labor superhuman that would have worn out the courage of most men, he fitted out expedition after expedition, and hurled his money, time, and energy against the almost impregnable fortress of the North. The result was the discovery of Melville and Heilprin Land; and a solution of the long-disputed question whether Greenland was an island; much new knowledge of the Arctic Highlanders was obtained; the greatest meteorites known were found and brought to the United States, and, at last, at the age of 53, he reached the North Pole, the goal for three hundred years of daring dreamers. The discovery of the Pole proved that the spirit of man is indomitable in its struggle with physical obstacles and the price of immortality is pain.

"In the first years of his service in the Navy, Peary had the experience of most Navy men—he was called upon to accomplish what was regarded as the impossible. The young engineer was directed to make plans for a new pier at Key West, Florida, which the contractors said could not be built. Peary was sent to build it. He did build it, and at a saving of $30,000 on the estimated cost.

"Later the department ordered him to Nicaragua as Chief of the Interocean Ship Canal Survey. Here he acquired experience of the utmost value in his future Arctic work—he learned to manage men, gained experience in equipping expeditions, in making camp under adverse conditions, and in traversing wild and unexplored countries. His motto was, 'Find a way or make one'—*'Inveniam viam aut faciam.'*

"Robert Edwin Peary, son of Charles N. and Mary Wiley Peary, was born in Cresson, Pennsylvania, where his parents were living at that time, May 6, 1856.

"He came from an old family of Maine lumbermen. He was of French and Saxon blood and he numbered among his ancestors many seamen, soldiers, and pio-

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THE PEARY MEMORIAL UNVEILED BY THE EXPLORER'S DAUGHTER

On one of the several expeditions to the Far North when Mrs. Peary accompanied her husband, Marie Ahnighito Peary, affectionately known to the American public as the Snow Baby (now Mrs. Edward Stafford), was born, within the Arctic Circle and nearer the North Pole than any other white child. Her brother, Robert E. Peary, Jr., stands at her left. All the continents are carved in low relief on the granite globe (see page 646).

neers. The fiery French imagination from one side and Anglo-Saxon firmness from the other were blended in a temperament well suited for his great work.

"On the island, which he owned, Eagle Island in Casco Bay, with its rugged coast, his famous ship *Roosevelt* was planned. It is a great satisfaction to this country to feel that this Arctic expedition, together with the ship, was American. The *Roosevelt* was built of American timber and metal, in an American ship-yard, engineered by an American firm, and constructed on American design. Even the most trivial items of supplies were American, although Captain 'Bob' Bartlett and the crew were Newfoundlanders, our next-door neighbors.

"The ship was built with a knowledge of the requirements of Arctic navigation gained by experience of six former voyages into the frozen North. So the expedition went north in an American-built ship, by the American route, and in command of an American, to win an American trophy.

"Peary tells us, 'I have always been proud that I was born an American, but never so proud as when in that biting, sunlit Arctic day I saw the Stars and Stripes waving at the apex of the earth and told myself that an American had set "Old Glory" there. As I watched it fluttering in the crisp air of the Pole, I thought of the twenty-three years of my own life which had been spent in laboring toward that goal, and realized that at last I had made good; that I could now lay at the feet of my country a trophy which the greatest nations of the world had been struggling to attain for nearly four hundred years.'

"At this time Peary would not like us to forget the splendid aid of the twenty-one brave and patriotic men who composed the personnel of the expedition. Foremost was Captain Robert A. Bartlett, 'Captain Bob,' as he was affectionately

called, whom Peary describes as 'tireless, faithful, and enthusiastic' and 'true as the compass.'

"The question of money to equip and furnish men and food was a serious one, and the Stars and Stripes would not have been nailed to the Pole by an American except for generous aid from the Peary Arctic Club. The President, Morris K. Jessup; the Secretary, Herbert L. Bridgman; General Thomas H. Hubbard, and others contributed large amounts.

"The scientific societies and authorities of the world, without exception or reservation, have recognized the high and authentic value of Peary's work, and few men have received such unanimous acclaim and reward of merit. More than a score of medals have been presented to him by the great geographical and exploring societies of Europe and America.

"It is often said that republics are proverbially ungrateful. This is not true in regard to Peary. The President of the United States, William Howard Taft, and the Secretary of the Navy, with just pride that the honor had come to the United States, requested of Congress that fitting recognition be accorded to Peary for his great achievement.

"Congress, on March 4, 1911, authorized that Civil Engineer Robert E. Peary, U. S. N., be placed on the retired list of the Navy with the rank and highest pay of a rear-admiral, dating from April 16, 1909; also giving him the thanks of Congress for his Arctic explorations resulting in the discovery of the North Pole.

"Previously the thanks of Congress had been bestowed only upon those who had won battles on land or sea to the glory of their country.

"So, in this hallowed Westminster Abbey of America; here, surrounded by the noble men of the Navy and Army who gave their lives, but left behind them immortal glory, and who won the never-ceasing gratitude of their country—here we come, like the Egyptians of old, to erect a monument on which to carve a record of Robert Edwin Peary's wonderful deeds of bravery."

TRIBUTE BY ASSISTANT SECRETARY OF THE NAVY, COLONEL THEODORE ROOSEVELT

"It is a very real privilege to be permitted to speak here at the Admiral Peary Memorial. To our family Admiral Peary was more than a name and an achievement. He was a personality. Again and again I have heard my father discuss him, and always in terms of high admiration.

"The march of the modern civilization of man has been predicated largely on the impulse for inquiry. From the 7th century B. C., when the Phœnicians sailed, by direction of the Pharaohs, down the coast of Africa; from the time when Hanno, the Carthaginian, skirted the west coast of that continent, down to the voyages and explorations of the present day, man has ceaselessly struggled for knowledge, development, and dominion. Admiral Peary is a great figure in this advance of man.

"Our own country is built by the toil and hardships of the pioneers, who pushed their way ever west through the then trackless wilderness. It is this spirit, transmuted, which forms the basis of our American Government and ideals. Should the steel of our national fiber lose the temper which made such achievements possible, our nation will be on the decline.

"In the nation-builders of all times and countries, there was the ceaseless urge to achievement. Every one of them heard constantly the whisper,

> "'Something lost behind the ranges,
> Lost and waiting—go.'

From Columbus to Peary, with farseeing eyes, they pressed on their quests. Their triumphs were not triumphs easily obtained, in soft circumstances. From Columbus to Peary they met and overcame, by their character and ability, obstacle piled on obstacle.

"Admiral Peary will stand to the generations of Americans in the future as an incentive to high endeavor. To me, Admiral Peary's life is epitomized in the splendid lines from Tennyson's 'Ulysses':

> "'To strive, to seek, to find, and not to yield.'"

INSCRIPTIONS ON THE MONUMENT

The great globe rests upon a massive base, also made of white granite from the quarries of Maine, the State that Peary loved. Upon one side of the base is the Latin motto, *"Inveniam viam aut faciam"* (I will find a way or make one), which the explorer often quoted and which seems a fitting epitome of his notable career.

© Harris and Ewing

VIEW OF THE PEARY MEMORIAL, LOOKING NORTHWARD TOWARD THE AMPHITHEATER

Under the motto is the inscription:

Erected by the National Geographic Society. Dedicated April 6, 1922, the President of the United States, the Chief Justice of the United States, the Secretary of State, the Secretary of the Navy, the Dean of the Diplomatic Corps, and Board of Trustees of the National Geographic Society officiating.

The other sides, respectively, bear the legends:

Robert Edwin Peary, Discoverer of North Pole April 6, 1909.

Rear Admiral U. S. N., Civil Engineer, Explorer, Scientist, 1856-1920.

His Beloved Wife
Josephine Diebitsch, 1863 ——

For many generations to come the unique memorial, designed in accord with suggestions Peary dictated to his wife shortly before his death, will stand as a landmark in the silent city of the nation's hero dead. It consists of an oblate spheroid, representing the earth, with the land masses carved in low relief upon its surface (see page 644). At the point on the massive globe which represents the North Pole is a bronze star.

This star points toward the north, in the direction of Arlington's beautiful memorial amphitheater, only a few hundred yards distant.

CONSTANTINOPLE TODAY

By Solita Solano

BYZANTIUM is dead. New Rome is dead. Constantinople is ill. Soon this one-time Queen City of the East will be replaced by a modern European center of business and commerce, functioning on the most famous cross-roads in the world.

Stamboul—home of Roman emperors, capital of magnificent sultans, scene of fabulous tales which every one has read—is now falling into decay upon its seven hills. Everything has an air of being second-rate and outworn. Acres laid bare by careless fires constitute one-fourth of the city's area, and the remainder is for the most part covered by unpainted, weather-stained houses with rotting window lattices above and small, dirty shops beneath. Mosques and tombs are dusty and neglected.

Yet, in spite of all this, Stamboul retains its magic of a uniquely situated city, and from afar has still a beauty that is incomparable. It is seen at its best in that famous approach from the sea to the Golden Horn, in which is reflected, as in a bright mirror, the city of Constantine, of Justinian and Theodora, of Theodosius and Mohammed II, with an effect so unfamiliarly lovely that it is like an artist's dream in which minarets and great domes seem to float above the mist.

Then, at close range, the picture fades and one becomes suddenly disenchanted, as if a once beautiful woman had dropped her veil and revealed the ravages of time.

MODERNITY HAS LEFT ITS MARK EVERYWHERE

Few places in the world have exercised such a power of attraction for travelers as Constantinople, or have had such widespread reputation for being picturesque.

The severe, classic art of Athens is not found here; nor the dignity of Rome; nor the exciting, sullen spirit that permeates Peking. It is not gay like Paris, nor learned like Berlin. An archeologist would be better pleased with Egypt. But this is the place before which Gautier, Byron, Loti, De Amicis, and Lamartine wept and swooned with delight before they sat down to fill books with ecstatic praises.

Practical modernity has left its mark everywhere, especially since the city's occupation by the Allies, and soon the pictorial appeal that now remains will be gone forever. It will be a clean, decent, civilized city—but no longer Constantinople.

Already there are on all sides the changes due to western influence—trams, electric lights, telephones, unveiled women, and a new, safe bridge. Gone are the brilliantly colored costumes, the groups of faceless women guarded by eunuchs, the pariah street dogs, the Sultan's pompous ceremonies, the harems, the life in the palaces along the Bosporus. And, although the foreign ministers of Great Britain, France, and Italy, at a conference in Paris in March, agreed to restore the Turks to full authority in their capital, it is safe to assume that the magnificent misrule of the Sultans has come to an end.

A CITY OF THREE SEPARATE PARTS

Constantinople's geographical position has made her sanguinary history, for she controls a highroad of commerce between Asia and Europe, and Nature herself planned the ports. The city is divided into three separated quarters. Stamboul and Pera-Galata lie on the European side, the Golden Horn between them, and Scutari squats on the Asiatic side, across the Bosporus. Like outstretched arms, the two straits come up from the Sea of Marmora to the south (see map, p. 650).

Galata and Pera are the European quarter, opposite Stamboul, where the representatives of foreign powers have long maintained their embassies and homes. Once the suburbs of Stamboul, this part of the city was known as Justinianapolis until the Genoese made it into an Italian town and fortified it with walls and many towers, one of which, the Galata Fire Tower, still stands, a lofty lookout station from which fires are reported and signals flashed to ships after dark.

Photograph from Rear-Admiral C. M. Chester

PERA-GALATA FROM THE HEIGHTS OF STAMBOUL

As one looks northeast from some eminence of Stamboul, the native city on the site of Byzantium, one can see the low-lying quarter of Galata and the ridge of Pera, where the leading hotels and embassies are to be found. From the left reach the Petits Champs, fronting which are many of Pera's palaces of democracy and monarchy.

Photograph from Frederick Simpich

THE BUSY PORT OF STAMBOUL

The many recent changes in the world map have closed some old trade routes and opened new ones. With the Dardanelles no longer obstructed the vast regions of the Black Sea coasts and Caucasia are being thrown open to trade.

Drawn by A. H. Bumstead

A SKETCH MAP OF CONSTANTINOPLE

Its situation at the cross-roads between the East and the West has caused Constantinople's history to be written in blood. While Great Britain, France, and Italy have decided to restore the Turks to full authority in the city (see page 647) and to the Asiatic side of the Dardanelles, provision is made for a broad demilitarized zone and an Allied force is to remain in occupation of the Gallipoli Peninsula to safeguard the free and unimpeded entrance to the Straits. The navigation of the Straits is to be placed under the control of an International Commission under a Turkish president.

Nowadays Pera's crooked streets are alive with Allied soldiers, refugees, relief workers, adventurers, peddlers, beggars, and a few tourists. Passports, unless one has business, are difficult to get, and tourists are rarely seen.

The American residents number about four hundred, the largest colony between Rome and Manila. There is but little social life and the only places of amusement are the cafés and restaurants, with their adjoining cabarets and moving-picture screens.

THE GALATA BRIDGE HAS LOST ITS COLOR

While the Galata bridge between the European quarter and Stamboul still lives up to its tradition of having every nation-

ality in the world cross it at least once an hour, it lacks some of its old charm because of the Turkish people's renunciation of color. The men for the most part have adopted the European business suit, with which they wear a red fez, and the women's costumes are usually of black. With this change, the human rainbow that once confused the eye has lost much of its brilliancy.

What the Rialto bridge is to Venice, the Pont Neuf to Paris, the Westminster to London, so is the Galata bridge to Constantinople—the keynote to the city.

A constant stream of polyglot peoples flows across the Golden Horn: Russian refugees, in pajama coats tucked into trousers grown too large; Armenian and Greek merchants and refugees; British, French, and Italian army and navy officers; American sailors; Chinese, Japanese, and Persian merchants; the last of the outmoded eunuchs; dervishes in brown, with cone-shaped hats; Cretans in baggy trousers and embroidered vests; Greek priests with black chiffon veils streaming from their hats; *hamals* (porters) with roomfuls of furniture on their backs; Arabs in yellow burnooses; maimed and diseased beggars; Mohammedan priests in pink or green robes; black troops in red caps and sashes; Jewish guides; American relief workers; Hindustani guards in twisted turbans and scarlet capes; an occasional woman gypsy in baggy trousers; Levantine tradesmen; Albanian peasants in embroidered white leggings; Hawaiians, Filipinos, and a few drummers from "points west of Chicago"—all these pass back and forth in the course of a day.

TURKISH WOMEN EXEMPT FROM FORCE

The taxes were recently doubled on the bridge, and the eight Turkish collectors were ordered to make the Turkish women, previously exempt, pay for the privilege of crossing the Golden Horn. The women, however, indignantly refused, and at both ends of the bridge a constant conflict went on between protesting officials and the women, who slipped by with exclamations of anger.

The collectors did not have the temerity to lay hands on these toll evaders, because Turkish women were for so long a time the exclusive property of their husbands that custom still forbids a man detaining a woman by force in any sort of public argument.

The traditional sacredness that surrounds the person of a Turkish woman had a curious result during the war, for the Turks did not dare to search one of them, even though it was known that she carried unlawful messages in her garments.

BOATS FILLED WITH COMMUTERS

On both sides of the bridge are docks for small steamers that take commuters back and forth between the Golden Horn and Scutari, the fifteen stations of the Bosporus, and the Princes Islands. At rush hours these efficiently operated boats are as packed as a New York ferry.

Many of the commuters are the prosperous Greeks and Turks, who maintain summer homes for their families on the Princes Islands, an hour or more away.

Passengers bound for Scutari are chiefly the poorer class of Turks and wealthy Armenian business men.

The Bosporus boats carry the largest crowds morning and evening because of the popularity of the beautiful villa section on the Straits.

On these boats are Turkish bankers, British tobacco merchants, English governesses, and French officers, the latter availing themselves of the bench marked "For the use of the officers of the Allies." And even if there are no officers aboard, a civilian is not permitted to occupy this bench.

All Constantinople is now safe for foreigners except, perhaps, certain parts of Scutari, against which European women are warned at night.

If anything of the real Turkey is to be seen, Pera must be abandoned for Stamboul. In this ancient city, which was Byzantium and New Rome, the mosques, coffee-houses, *turbehs* (domed tombs), and fountains remind one, even in their dilapidation, of the city's past days of greatness.

Although the houses are nearly all constructed of wood, they are never painted, for the Turks have a theory that if their property looks prosperous their taxes will be increased. So the window lattices crumble and fall, the boards sag, the shingles warp, and nothing is repaired.

Photograph from Solita Solano

THE BOBBING BOATS OF THE GOLDEN HORN

The waters around Constantinople teem with boats, and Venice with its gondolas has no livelier waterfront than Stamboul. Across the Golden Horn rises the Galata Tower, from which the tourist can obtain a wonderful view of the City of the Sultans. It is now used as a fire lookout.

Photograph from Solita Solano

LOOKING DOWN THE GOLDEN HORN FROM THE TURKISH CEMETERY OF EYOUB

Near where the Golden Horn curves back upon itself toward the left and shrinks away into the Sweet Waters of Europe, on a cypress-shaded slope high above the water's edge, there is the quiet Turkish Cemetery of Eyoub, whence one can look down the Golden Horn, with Stamboul on the right and the heights of Pera opposite, past the Port of War and the old bridge to the Port of Commerce, its farther limits marked by the new bridge of Galata, and so to the place where the Bosporus, the Golden Horn, and the Sea of Marmora unite beneath the historic walls of the Old Seraglio.

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WHERE COMMERCE CLEAVES THE WATER AND RELIGION SPEARS THE SKY

From the Golden Horn, Stamboul is never twice the same. Noonday and sunset paint with varying touches the tinted mass of buildings whose irregular outline shows against the springtime blue or the flaming evening sky. And always, scudding before the wind, panting forward with propeller, paddle-wheel, or oar, or slowly drifting in the tide, the boating of the city moves in devious ways.

The population is inactive and looks discouraged. Men sit in cafés and talk about the hard times. Old graybeards sit on the sidewalks and smoke nargilehs. The letter-writer has a stand near the centrally located mosques, and still makes an excellent living from the Turks, few of whom can read or write.

A group of dervishes, who, like the city, have declined in picturesqueness, pass slowly up the streets. *Hamals,* the native expressmen, stagger along, crying, "Make way!" As in the old days, *kabobjees* slice off strips of roasting meat to tempt the appetites of the passersby.

RUSSIAN REFUGEES ARE EVERYWHERE

As in Pera, Russian refugees are everywhere, selling flowers, kewpie dolls, oil paintings of Constantinople, cakes and trinkets, books and newspapers printed in Russian. They sleep in the open streets and on the steps of the mosques. They loaf, beg, work when they can find a job, and sometimes sob with hunger.

A few Russians have been lucky enough to find positions in restaurants as waitresses or coatboys. A princess may bring the patron's coffee and a general hand him his stick. Professors, ex-millionaires, women of high birth, beseech one to buy cigarettes or paper flowers. A small colony in Pera has taken possession of an embankment and hung up two blankets to make it seem homelike.

The most important changes that have taken place in Constantinople in the past five years are the refugee situation, the emancipation of women from the worst of their slavery, the devastating fires, and the influx of American goods and business.

The refugee situation is heartbreaking, but has been greatly ameliorated by the activities of the American Red Cross and the Near East Relief.

The Red Cross has established 147 institutions, given a dinner a day to thousands, clothed ten thousand men and unnumbered women and children, and equipped a hospital and training school for nurses.

The Near East Relief has opened two hospitals and fifty children's clinics, supplied visiting nurses and work for hundreds of refugee women, established five Armenian, six Greek, and many Russian camps, and placed 56,000 children in orphanages and tuberculosis hospitals. Besides, this organization has sent enormous food supplies to devastated areas.

Refugees have poured into Constantinople in veritable rivers of humanity. Populations of entire villages—Greeks, Armenians, Russians, Jews, Turks, Georgians, Azerbaijans—have reached the city penniless, there to live in open streets, in camps, on the ruined walls, in huts made of boxes, in discarded army tents.

Their numbers are appalling. For instance, 158,000 Russians alone came to Constantinople up to October, 1920. Most of them came down with Wrangel's army from the Crimea, packed so tightly in small boats that some of them died and others were born, in an upright position. All but 45,000 of these have been sent away into Rumania and Bulgaria, where there may be food for them. Those remaining have lived as they could.

One enterprising young refugee put electric lights in the Basilica Cistern, to the left of Sancta Sophia, and now charges half a Turkish pound to row visitors once around the beautiful dim spaces. This cistern was built by Constantine the Great and contains 336 pillars.

Dwellers in the houses above have made holes in the flooring, through which they let down pails on a cord and use the cistern water for purposes which may be, despite appearances, cleansing.

GENERAL WRANGEL LIVED ON A YACHT

Following their escape from the Bolsheviks in the Crimea, General and Baroness Wrangel lived on a yacht, belonging to the former Russian embassy, which was anchored in the Sea of Marmora. A short time ago the yacht was mysteriously sunk, but the General and his family escaped injury. The remainder of the General's army camped for a time on the shores of the Dardanelles. Many of the men were highly trained engineers, professors, students, lawyers, and doctors. General Wrangel arranged to have these men placed in Bulgaria and Jugo-Slavia, either in private life or as frontier guards, with the hope that some day they would be able to return to Russia to serve as the nucleus of a new intelligentsia.

THE "ROMANTIC" NEAR EAST IS DEALT A DEATH BLOW

The freeing of the Moslem woman from the most binding of her fetters came with such rapidity that most of the world has not yet heard about it. The visitor to Constantinople who expects to see romantically veiled women coquetting from beneath perfumed chiffon is likely to be disillusioned about twenty feet from the pier, when he catches his first sight of feminine Turkey in the person of a street-sweeper in ragged black trousers and a dusty coat.

This is about the only civic job open to women as yet, although they are employed in banks and offices. Curiously, there are no stenographers, for Turkish is in itself a sort of shorthand and easily written. The Europeans employ Greek women as stenographers and typists.

Only a few old-fashioned women, mostly in Stamboul, now wear the veil part of their national headdress over their faces. Yet even with the comparative freedom they now enjoy, and the disappearance, for economic reasons, of the harems, there are curious survivals of old customs.

One is the law forbidding Turkish men and women to appear together at a public place of entertainment, be they husband and wife, brother and sister, or mother and son. A woman may go to the "movies" with another woman and sit in a section reserved for women only.

I asked the manager of the cinema near the remains of the old Petits Champs Cemetery if many Turkish women came to his theater.

"No, and I don't want any of them here," he replied. "If they come alone they are stared at, and if they come with a man some one calls the police."

But the new Magic Theater bought a special dispensation, and this is the only theater where a Turk may bring his wife.

THE FAMOUS GOLDEN GATE THROUGH WHICH IT IS PROPHESIED A CHRISTIAN CONQUEROR WILL ONE DAY ENTER THE CITY

The ram in the doorway is devoted to the keeper of the Castle of the Seven Towers (Yedi Kuleh) and accompanies him when he shows visitors the prison in the tower above, where formerly political prisoners were decapitated and foreign ambassadors detained.

Photographs by Solita Solano

THE ADRIANOPLE GATE, THROUGH WHICH MOHAMMED II ENTERED THE CONQUERED CITY OF CONSTANTINE.

Each succeeding sultan has entered Constantinople through this gate in the Valley of the Lycus, on his way to the palace after the ceremony of being girded with the sword of Osman at Eyoub Mosque (see map, page 650).

Photograph by Fehr Fisher

AN EXPONENT OF ABSTINENCE IN THE MOSLEM CAPITAL

Thanks to the prohibition dictum of the Prophet, orthodox Turks fraternize over thick, syrupy coffee instead of over the fiery glass of arrack. Itinerant water-venders pass through the streets with brass vessels and clinking glasses, dispensing drinks.

Photograph from Solita Solano

IN THE HUNGRY EAST, BEGGING IS AN HEREDITARY PROFESSION

The beggar of the Orient is a professor of humanities. Grandson follows grandfather in the ceaseless struggle for bread, and in the training he becomes a student of human nature and a marvel of persistence.

RELIGIOUS FRENZY MADE A TOURIST SHOW

The whirling dervishes of Constantinople, like the howling dervishes of Egypt, have long been among the prominent tourist attractions. The novice must serve the order at menial labor for 1,001 days, and if he fails one day during that time he must start all over again.

Photographs from Solita Solano

CLEANLINESS BEFORE GODLINESS

At the hour of prayer the mosque yards are crowded with worshippers washing their hands, arms, nostrils, and ears according to a strict ritual. Many mosques have shallow basins for these ceremonial ablutions, but at the Yeni Valideh Djami there are brass faucets with running water.

VOLUNTEER FIREMEN OF CONSTANTINOPLE

They help to put out the blaze, but they also fill their pockets with any small objects that take their fancy, and bargain first with the inmates of the house while the fire is gaining force (see text, page 661).

Photographs from Solita Solano

WHERE CEREMONIAL WINE WAS DISPLACED BY CEREMONIAL WATER

The Yeni Valideh Djami in Galata occupies the site of a church to St. Francis, in which the use and trading in wine so offended the abstemious Moslems that they burned down the edifice. The present structure was erected in 1697 by a Cretan lady who was the Sultana of Mohammed IV.

Photograph from Solita Solano

THE NEW GALATA BRIDGE ACROSS THE GOLDEN HORN

Long famous for the colorful crowds which pass between Galata and Stamboul, the new bridge is a great center of interest. Street-cars pass to and fro, and the small steamers which connect the city with the suburban villages tie up along its flanks. In the blaze of war the rainbow tints so common here were dissolved, and Galata bridge has become almost prosaic in its hurried busyness.

Until recently a man and woman did not walk together in the street, and up to six years ago there was a law forbidding them to drive in the same carriage. And if a husband and wife met in the streets, it was contrary to custom to acknowledge the acquaintance.

Now a woman may walk with a man of her own faith, but not with a non-Moslem, although she may receive him in her own home.

The street-cars have a special compartment in front reserved for Turkish women, and if a woman of the old school boards the car, the conductor hastens to draw moldy red curtains to protect her from male eyes and insure her privacy while she lifts her veil, rolls a cigarette, and borrows a light from another woman.

COLLEGES NOW OPEN TO WOMEN

With the passing of harem traditions, women have advanced from childlike ignorance to an intelligence that has astonished every one who knows of the conditions under which they have lived for hundreds of years. Colleges are now opened to them, and the men's medical school has announced its readiness to instruct girls. But outside Constantinople no such progress has been made. Many women still veil in the street and fear every man.

FIRES HAVE LEFT THEIR TERRIBLE SCARS

The devastating fires that have ever been working toward the destruction of Constantinople caused the city to be built anew every fifty years, until a law was passed prohibiting the construction of wooden houses on the site of burned ones; in fact, it was provided that no houses at all should be built until the city government planned new streets.

Nothing has been done about the planning, however, and the result is that one-fourth of Stamboul—more than 22,000 houses, burned during the past twelve years—still lies in ashes. Scutari, too, has vast ruined sections. So has Pera, on a much smaller scale.

When a fire starts in Stamboul it nearly always assumes frightful proportions. In the fire of 1908, 1,500 buildings were destroyed; in that of 1911, 2,463 houses; the following day an entire Jewish quar-

ter burned; in 1912 an immense area between Sancta Sophia and the Marmora was consumed. The fire of June, 1918, burned 8,000 buildings, clearing a space from the Golden Horn through the center of the city. These fires are enormously destructive because of the narrow streets, wooden houses, and volunteer firemen who go to answer the call on foot, carrying a pump on their shoulders.

FIGHTING FIRE IN CONSTANTINOPLE

The firemen of Constantinople are worth a story in themselves. Unpaid for their services, they reason like this:

"If we don't go to this fire, the owner will lose all his belongings. If we go and take some of them home with us and leave some to him, is he not better off than if we hadn't come at all? We give our services free of charge; the owner must give us bakshish if he wants us to risk our lives for him.

"We get to the fire as quickly as we can run, and if the owner does not consent to give us money at once, so we can get to work, the fire will gain headway; that is not our fault, but his."

It was a cause for grief and accusations of injustice when the British installed their own fire system in Pera. By the time the Turks come panting down the street to bargain, the British have the fire out and are driving away.

Photograph from Solita Solano

WHERE A PORTER EARNS HIS NAME

The *hamal* is said by the Arabs to be the human camel. Not only do the names sound alike, but each, if a heavy load is to be carried, must be loaded by other workers, and each, once loaded, can carry his burden for incredible distances. One of these human express-wagons, if asked to carry a much smaller burden in his hands or under his arm, will shrink from the effort.

MOST EXPENSIVE CITY IN THE WORLD

The publisher of *The Orient*, the only American newspaper in Stamboul, says that the fires have caused the housing situation to become acute and the rents to mount enormously. In fact, it costs more to live in Constantinople today than in any other city in the world, not excepting New York. The city is especially crowded now with refugees and foreigners, who add 30 per cent to the population, which, according to estimated figures, now totals 2,250,000.

This overcrowded condition will grow worse until some one starts to rebuild the ruined areas. As Stamboul has stood since 300 B. C., it would be a crime against science to rebuild without scientific supervision of the digging and a systematic exploration of the site by archeologists.

The fourth important change affecting the city is the influx of American goods,

Photograph from Edwin A. Grosvenor

WHERE IRON BARS PAY TRIBUTE TO THE CHARM OF WOMANKIND

The Turk is not lavish of paint, for under Moslem rule to be reputed rich is not always a blessing. By protecting the surface the owner is not sure to protect all (see text, page 651). But shameless as he is about the appearance of his house, in the old days he jealously guarded his womenfolk, upon whose actions he esteemed an iron grating better bar than many a precept spoken to listless ears. Note the bird on the nest under the bay window.

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A FRUIT-VENDER OF STAMBOUL

Pera has its smart shops, where choice vegetables and fruits can be bought by the one-price system; but in Stamboul, in the open-air markets, bargaining is the rule, where a smile counts for many a para and where patience is better than bluster.

caused by lack of food and other supplies in this part of the Levant.

Before the war, American sewing-machines and petroleum were practically the only importations. Other goods were little known, and the first American cargo vessel steamed into the harbor in 1919. Now all kinds of flour, canned milk, fruits, cloth, hardware, and shoes from the United States are bought and admired by Turks and Europeans, too.

WHEN AMERICA CAME TO TURKEY

The history of American activities in Turkey is brief, and was foreshadowed by the American missionaries, who worked their way eastward from their first base, Malta, to Smyrna, Jerusalem, Alexandria, and Beirut. About 1819 they also went to Constantinople and through Asia Minor as far as Persia.

In the '60's the foundations were laid for Robert College and the Syrian Protestant College. These institutions (with the American College for Girls, founded in 1871) are the greatest monuments of American philanthropy in the Near East. The Stars and Stripes were first seen in the waters of Constantinople in 1800, when the Bey of Algiers forced Captain Bainbridge to sail there in his frigate, the *George Washington,* bearing presents and messages to the Sultan. Today the American Trade Commission, the Standard Oil, the American Trade Corporation, the Chamber of Commerce of the United States, the U. S. Shipping Board, the American Hospital, the Sailors' Club, the Y. M. C. A., the American Bible Society, and many business firms are established here, and America is greatly beloved and respected for her works of charity.

THE WALLS OF BYZANTIUM STILL STAND

The walls that inclosed Byzantium and saved civilization for a thousand years are still standing, and constitute, with the exception of Sancta Sophia, the most interesting historical monument in Turkey.

The impression produced by these battered and lonely ruins is ineradicable. The lines of walls and towers still stretch

MOHAMMEDANISM'S LARGEST GATEWAY TO PARADISE

The Buyuk Mezaristan, in Scutari, is said to be the largest Moslem cemetery. From Stamboul one can plainly see the forest of dark cypress trees that marks the spot. These, "the only constant mourners of the dead," have long been a distinguishing feature of Turkish cemeteries, where a new tree is supposed to be planted for each new tomb.

Photographs by Solita Solano

A PASTURE GROUND AMONG THE DEAD

Sacred as is a Turkish cemetery, the Moslems do not feel that a burial ground is solely for the benefit of the dead. The cemetery has long been the woman's club, as the coffee-house has been the man's, and here in Scutari some thrifty herdsmen graze their oxen among the gaily painted tombs, well knowing that they will be safe till evening time.

Photograph by Carrie E. Mills

THE MISSOURI MULE IN AN UNFAMILIAR SETTING

American relief agents, while alleviating the suffering in the Caucasus, are doing much to make Detroit and Missouri famous. From Constantinople these animals are shipped to various Black Sea ports, from which they carry American milk to the orphaned children of Asia Minor.

THE CRUMBLING WALLS OF YEDI KULEH, STAMBOUL

The seven towers of this old fortress once confined the ministers of all such states as might be waging war against the Turk. Mohammed II erected a new structure on the foundations of an old Byzantine citadel, not far from the place where the land wall joins the sea wall beside the Sea of Marmora.

Photograph by Solita Solano

THIS OBELISK MARKED THE CENTER OF THE HIPPODROME

The historic monolith, erected more than 1,500 years ago, is of rose granite, 61 feet high, and came from the Temple of the Sun at Heliopolis, Egypt, placed there by Thothmes III twenty centuries before the Christian era. Greek and Latin inscriptions say the 199-ton stone was raised on the Hippodrome in 32 days. In the lower right corner of the picture is seen the headless Serpent's Column, an offering of Greek devotion to Apollo after the Battle of Platæa, when the Persian hordes had been forever hurled from Europe. Three serpents, twisted around each other and standing on their tails, compose the column, now but 18 feet 9 inches high. In the background rises Sancta Sophia.

Photograph from Solita Solano

THE CASTLE OF EUROPE AND THE COLLEGE OF AMERICA

Here, where the Bosporus narrows to its closest confines and the shore of Europe comes nearest to Asia, Mohammed II, a young man of 23, with whip and presents forced the erection of a mighty fortress in five months. Surrounding buildings furnished the materials for towering walls which formed the monogram of the Prophet and his namesake. Today Rumeli Hissar is famous as the home of Robert College (see map, page 650), one of the most influential of American colleges abroad.

Photograph from Solita Solano

"WHILE YOU WAIT" IN CONSTANTINOPLE

The Turk has his slippers, with their heels turned in, repaired while he waits. He slips into and out of them a hundred times a day, and, having but one pair, he sits and chats with the cobbler until the needed patch is added.

Photograph by Edgar J. Fisher

PRINCIPAL SQUARE OF ANATOLIA CAVAK, ON THE ASIATIC SIDE OF THE BOSPORUS

This is the village to which St. John Chrysostom was banished after he preached against the luxury and vice of the Constantinople court under the Empress Eudoxia. He was called back by the people, but still continued his sermons; so was again exiled.

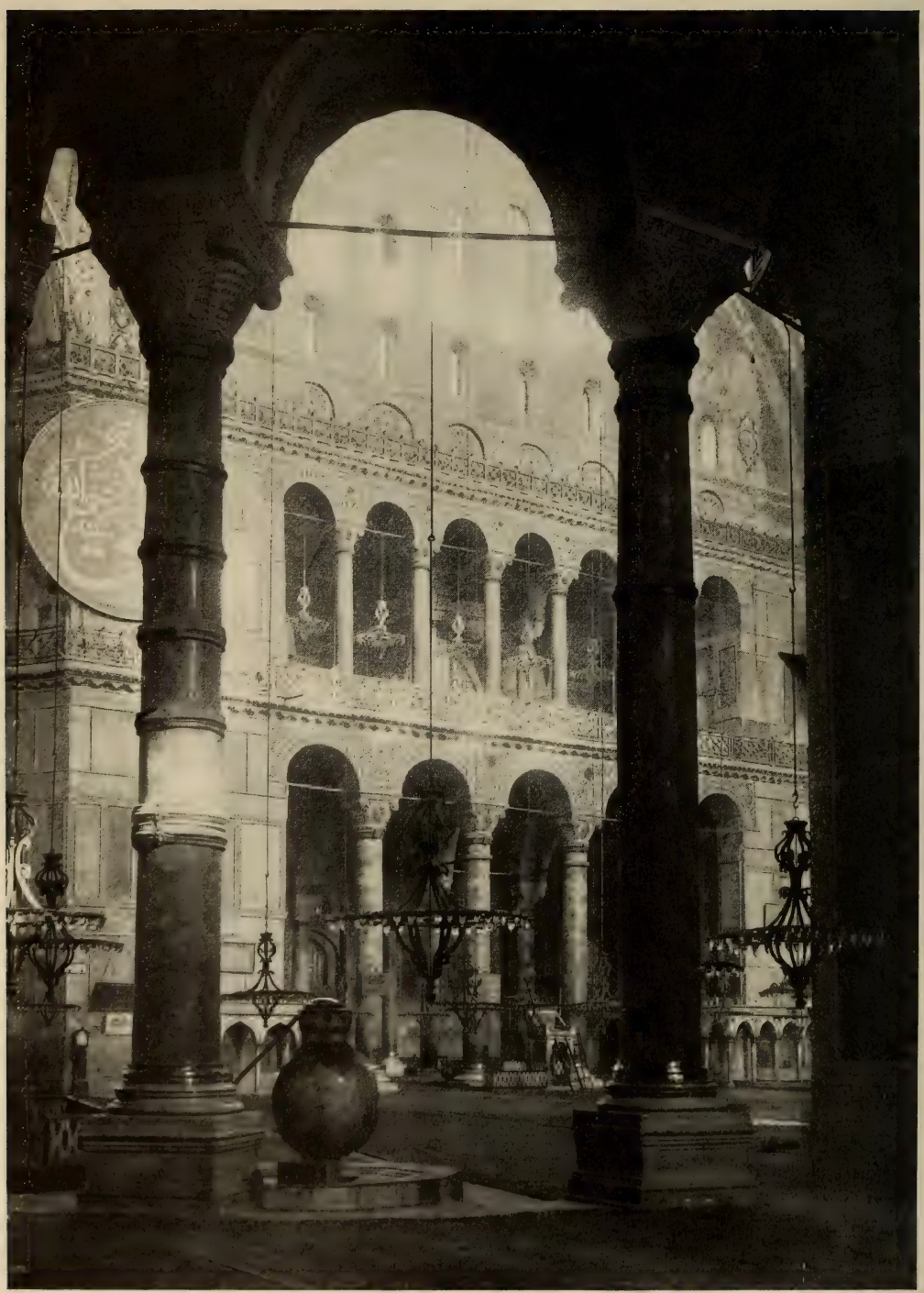
A MAN-MADE FASHION SPURNED BY THE NEW WOMAN

Thinner and thinner grew the Turkish veil, until now a large number of Turkish women go unveiled entirely. Religion may attempt to restrain and the conservative elements deplore the change, but the new woman bravely bares her face, with the added advantage that she has a veil handy in case she desires seclusion from inquiring eyes.

Photographs from Solita Solano

A LIVING BILLBOARD OF ILLITERACY, THE PUBLIC LETTER-WRITER

In Turkey elementary education is nominally obligatory and five middle-class schools for girls have been opened in the last four years; but only one in twenty-four of the population yet attends school and illiteracy is so prevalent that even the apparently well-to-do have no hesitancy in advertising their inability to write a simple business letter.



Photograph from Solita Solano

THE INTERIOR OF THE WORLD'S MOST FAMOUS MOSQUE

Into the splendor of Justinian's church the Janissaries poured, seeking for treasure; and there, beneath the costly mosaic of the Cross, the Christian women were distributed among the mercenary soldiers of the Turk. At noon Mohammed the Conqueror came and sent up thanks to Allah for his victory. So, on the 29th of May, in 1453, the Church of Sancta Sophia became a mosque.

out as far as the eye can see, rising and falling, tinted from dark brown to ocher and gray, sometimes bare, sometimes covered with vegetation. They are barbaric, threatening, mournful.

Modern Constantinople is forgotten as one tries to imagine what these barriers seemed like to the hoards of barbarians who came every few years, looked at those miles of moated and turreted walls, and then turned back.

Now gypsies and refugees live here and there in the ruins that extend for five miles across the isthmus, from the Sea of Marmora to the Golden Horn. They rob the gardens which are cultivated in the old moats, and watch with astonishment the occasional airplane that buzzes high over the walls of Theodosius II.

Seen from the air, the walls look like a long saffron cord, knotted and laid along the green countryside. Near Top Kapou, or Cannon Gate, where Mohammed the Conqueror battered an opening, Turkish boys from ten to sixteen years old practice every day to become volunteer firemen, stopping whenever a carriage passes to beg for coppers.

A MYSTERIOUS RUG INDUSTRY

At Yedi Kuleh, where the land walls begin, a mysterious sort of rug industry goes on between the four towers that remain of the original seven. Hundreds of rugs of all makes, shades, and sizes are piled up, treated with paint, and then spread to fade in the sun. Questions concerning the nature of the work are not answered and frowns follow the unwelcome visitors, as they move away to look at the Golden Gate or mount into the tower which was the Turkish Bastille, where political prisoners were decapitated or strangled.

Beyond the walls, about a mile from the Adrianople Gate, through which Mohammed entered the city, is a large Turkish cemetery, where once the Turks waited for the signal to storm the breaches in the great walls.

Photograph by W. P. Whitlock

SMILING FOR ALMS OUTSIDE THE MOSQUE OF SANCTA SOPHIA

That there is a close relation between religion and charity is well recognized by the beggars of the world. Inside the imposing cathedrals of Russia, scores of mite-boxes silently solicit funds. The approach to the Church of the Holy Sepulcher is so lined with importunate beggars that some one has called it "The Street of Palms." Beside the lowliest of Hindu shrines some mendicant is likely to be seen. Beneath the Cross charity flourishes, and in the shadow of the minarets the poor find bread.

When life was less troubled in Constantinople, the cemeteries were used as pleasure grounds for picnickers, as they are especially attractive places. Cypress trees planted beside the graves make graceful forests that spread over uncounted acres, where millions that have died since Mohammed lie sleeping.

Some of the newer tombstones are as gay as birthday cakes, with their painted

Photograph by Solita Solano

A GYPSY FORTUNE-TELLER

A feature of life in Constantinople is the gypsy fortune-teller from Arabia, who walks under the windows all day, crying, "I read your future in your hands." Many gypsies live in the ruins of the old walls, winter and summer. The cloth of which this woman's baggy trousers are made came from America.

flowers and vines and gilded railings. The older ones are gray, and their inscriptions are almost defaced by the rains of centuries. Many graves are so old that the stones have fallen and the earth has crumbled in upon forgotten bones, now laid open to view.

Women drive here from the country in gaily painted wagons with curtains which they need no longer draw. They bring their children and wilted chrysanthemums; then sit idly, without needle or book, staring into space, or else patronize the letter-writer or fruit-venders, who lie in wait for their custom. Beggars lounge in the sun. Near by a stone-cutter chisels a fez on a new tombstone.

In the Scutari cemetery, the largest burial place in the East, a Turk followed me about while I photographed his cows, which he had shut up for safekeeping in a private burial plot (see p. 664).

He said he had been waiting for some time to have the movements of the earth and sun explained to him. He could not understand why it was said to be night in America when it was day in Turkey. I explained, but, as I was leaving, he said: "Yes, that's what they say; but all the same I don't believe it is night in America at this moment."

SANCTA SOPHIA IS CAREFULLY GUARDED

Sancta Sophia, standing on the first of Constantinople's seven hills, now has soldiers' barracks at one side and guards everywhere. The Turks greatly fear that through the Greeks harm may come to their favorite mosque and have ordered that no person of Hellenic blood be permitted to pass the portals. Passports from all except Mohammedans are demanded at the gate, and the galleries are opened only by special order from the police.

From early morning until evening the mosque is visited by Allied soldiers, who have heard all their lives of this "terrestrial paradise, the second firmament, the car of the cherubim, the throne of the glory of God, the marvel of the earth, and the largest temple in the world after St. Peter's," that Justinian built in less than six years.

American sailors, English "Tommies," Italian and French officers and soldiers wander about, caps off, watching the Turks pray for the safety of their city. They gaze in wonder at the vast vault suspended over their heads, at the half domes, the 107 marble columns, the hundreds of windows, immense galleries,

partly obliterated cherubim, bold arches, and princely porticoes.

A guide whispers to them of the dramatic events that passed in barbaric pageant before the jeweled altar of the Byzantines, now shrunk to a mean black stone that points the Mussulman to Mecca. They crane their shaven necks to stare at the stone coffin over the door that contains the dust of great Theodora; at the mark on a pillar said to have been made by the hand of Mohammed; and at the place where the Conqueror's horse planted his hoof.

NEGLECTED BUT STILL BEAUTIFUL

Sancta Sophia is getting shabbier every day. The Turks have no money to keep up their public buildings and mosques. The walls are sagging again in many places and need the attentions of an architect. The gold leaf has crumpled and fallen from the dome. Ugly electric light bulbs have replaced the thousands of wicks that once burned softly at the feast of Ramazan. Yet, neglected as Sancta Sophia is, nothing can equal its beauty or destroy its grandeur.

In olden times Byzantium was called the "dwelling of the gods," because of the number of temples and shrines in the city. These were converted into churches by Constantine, and into mosques by the Turks, who built many new ones, all imitating the basilica of Justinian.

The steps of some of the mosques are the only homes many refugees know, especially the broad entrance of Yeni Valideh Djami, near the Galata bridge, where at least a hundred hungry men live. Between services they may go inside and admire the rose marble column which cost the conqueror of Candia his life, but when the muezzin calls out the hour for prayer all unbelievers are hurried outside.

THE HIPPODROME, CENTER OF BYZANTINE LIFE

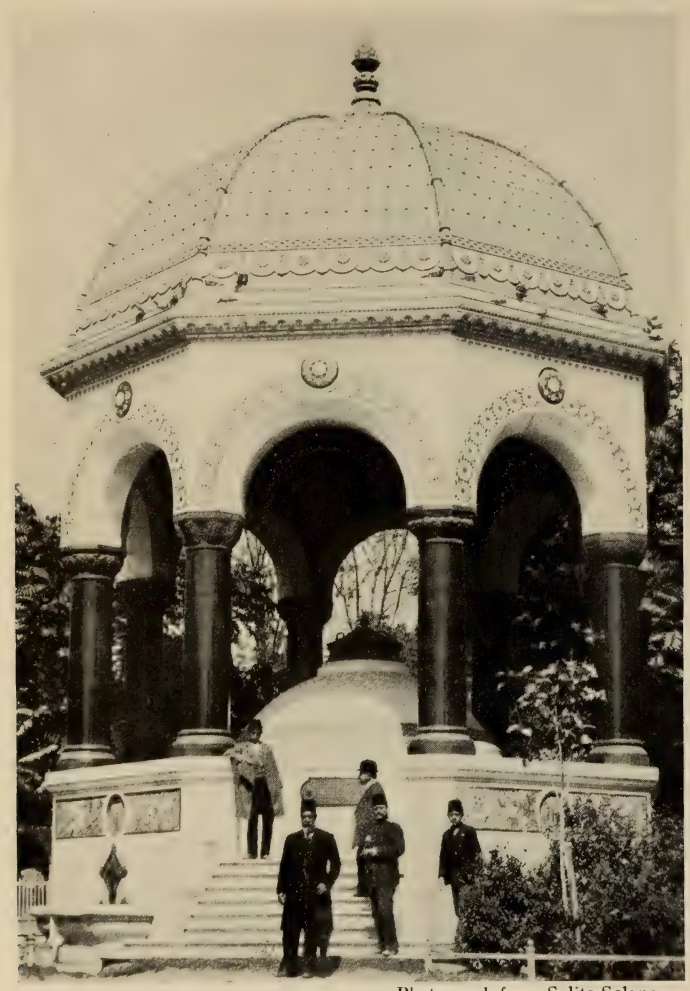
Within a block of Sancta Sophia is a large dusty square, the Hippodrome, the center of Byzantine life of the Middle Ages, which played the same part in the lives of the people as the Acropolis at Athens, the Forum at Rome, and the Temple at Delphi. Three times its present size, it was then the largest building in the empire, and was used for chariot races, gladiatorial contests, triumphal processions, and as a place of execution.

What a spectacle that crowd must have been when, adorned with jewels, it moved through the porticoes of the Hippodrome to cheer the Blues or the Greens, those rival charioteers whose politics upset the entire empire! Hither came the spoils of war, including thousands of statues from Greece and Rome, the bronze horses that

Photograph by Solita Solano

WOMEN NOW SWEEP CONSTANTINOPLE'S STREETS AS A SIGN OF THEIR EMANCIPATION

The brooms used are made of twigs. When the conservative religious element complained at the city's employment of women in this capacity, the reply was, "They are not women while they wear trousers, but men." So they kept their jobs.



Photograph from Solita Solano

A FOUNTAIN BEARING THE MONOGRAMS OF WILLIAM II AND ABDUL HAMID

In the ancient Hippodrome, where the obelisk of Theodosius and the serpent of Delphi reveal Constantinople's contact with the culture of the ancient world; in the very shadow of Justinian's church, made a mosque by Mohammed II, there is this fountain, which the ex-Kaiser gave to Abdul Hamid II and in which the monograms of the two friends appear together.

are now in Venice over the portals of St. Mark's, and images of gods, heroes, and empresses.

Now all but three of the monuments are gone from this shrunken space—the Obelisk of Theodosius, the brass Serpent's Column, and the Built Column. A religious class of *hafizes*, boys of ten and old men of seventy, walk along without a glance at two of the most interesting human monuments in the world (see p. 666).

Crossing the Hippodrome is a band of boy students in long coats. Fruit-venders stand motionless. There is nothing so devoid of life as a Turkish gathering place. Even the children are as inactive as tortoises, and do not know how to play with hoops, balls, or tops. Here and there a child is digging out mud from between the cobblestones, scarcely moving when a motor filled with Allied officers rushes past.

Nothing happens for perhaps ten minutes. Then some European women drive slowly by, almost colliding with a small motor car of relief workers that has just turned the corner. A landau from the Persian embassy passes. (The front of the embassy was painted recently in honor of the visit of the heir apparent.) Its occupant is dozing. A cart full of refugees, seeking a shelter, jolts along, loaded with children and bundles.

Later in the afternoon there are several arrivals at the square. A Red Cross nurse points out to a newly arrived friend the fountain which Emperor William gave to the Sultan fifteen years ago.

A Turk with bolts of cloth over his shoulder tries to sell suiting to every man he encounters. Donkeys come in sight, carrying vegetables. A water-seller, with a brass samovar on his back and a girdle of glasses about his waist, is followed by some boys, who try to emulate him by carrying porous water-jugs and one dirty cup. Some Russians stand disconsolate, with trays of cakes, dusty from their all-day exposure.

To enter the gates of the old Seraglio behind Sancta Sophia is to court disap-

Photograph from Rear-Admiral C. M. Chester

A JEWEL-CASE PALACE NEAR THE BANKS OF THE SWEET WATERS OF ASIA

Between the blue of the Bosporus and the green of the wooded hills there are many kiosks so delicate that from a distant vantage-point they resemble boxes of carved ivory. Near this kiosk on the banks of the Sweet Waters of Asia are the picnic grounds which Loti and other writers have made famous.

pointment, for one finds little in these abandoned buildings to satisfy an imagination fed with tales of the hundreds of years when this loveliest of spots was the stronghold and home of Byzantine emperors and Turkish sultans. Here twenty-five sultans were born, ascended the throne, were overthrown or strangled. Here, for three hundred years, were hatched the plans that kept Europe, Asia, and Africa trembling with forebodings.

The Seraglio is situated on that famous point of land that extends into the Sea of Marmora at the junction of this body of water with the Bosporus and the Golden Horn. On this spot stood the Acropolis of Byzantium. Now Seraglio Point is divided into two parts, the outer grounds and the Treasury. The Treasury has been closed for many months, and it is whispered that some of the celebrated jewels it contained have been converted into Turkish pounds, to aid the ruined government.

A few worn and dusty rooms in the old palace are shown to visitors by a modern young poet with a passion for translating Omar's quatrains into Turkish. He is the public host to such visitors as have permission to enter the grounds. The permits have been required since a souvenir-hunter walked off with a gold cup.

AN ENCHANTING PANORAMA ALONE IS LEFT

While two servants brought us coffee cups on a tray set on a frayed red pillow, the host quoted verses.

After coffee, the poet led us out to see the view which is all that is left of the former splendor. Spread before us was an enchanting panorama of the Sea of Marmora, the Golden Horn, and the Bosporus, with three cities of Constantinople clustered around them, resting between a sapphire sky and even bluer waters. At this distance we looked through a soft gray veil at the rose-colored roofs, the delicately pinnacled mosques that gleamed whitely in the sun, and the Allied fleet

Photograph by Solita Solano

CHEERFUL REFUGEES, DESPITE THEIR HOMELESS AND PENNILESS CONDITION

Photograph by Frederick Moore

A FEW OF STAMBOUL'S CANINE WARDS

Long used as scavengers, until an order, whose studied cruelty resulted from the Moslem reluctance to kill, banished them to cannibalism on a tiny island, the dogs of Constantinople have claimed their full share of notoriety. Today their number is greatly reduced and they are no longer the pest they once were.

COOKING AND WASHING IN A REFUGEE CAMP IN CONSTANTINOPLE

Photographs from Solita Solano

ARMENIAN REFUGEES IN CONSTANTINOPLE

The Russians have no monopoly on the pathetic practice of refugeeing. The City of the Sultans has its thousands of Armenians who have flocked in from the stricken highlands of Cilicia and Van. They were among the most tragic sufferers in the World War, for their homeland was a battleground for contending forces.

Photograph from Solita Solano

FLOTSAM OF THE RED REVOLUTION: A RUSSIAN REFUGEE

One of the soldiers from Wrangel's army in Constantinople. Many of them were encamped for ten months on the Gallipoli Peninsula.

Photograph by Solita Solano

RUSSIAN REFUGEES SELLING CAKES

Hundreds of them walk the streets of Constantinople from daybreak to midnight and then sleep on the steps of the mosques or in the open.

SHOEMAKERS IN THE STREETS OF STAMBOUL

© E. M. Newman

that seemed like children's boats floating on the Bosporus.

Then we turned our backs on the view to walk about the decaying buildings and gardens that once saw a court life whose magnificence has scarcely been equalled by any other country in the world. The gardens lay deserted in the sunlight, except for two old eunuchs who walked across the grounds toward the still beautiful Bagdad Kiosk.

CONSTANTINOPLE'S BAZAARS

The bazaars have always been a feature of the life that lies between Turkey and India, and modernity has not changed them. Pera has one which occupies the middle of Step Street, leading up from Galata. Last year the Russians took the last of their trinkets here and sold them for food.

A still larger street bazaar in Stamboul is known as the Manchester Market, because practically all the cotton goods sold to the crowds of women and girls come from Manchester, England. According to a leading English merchant of Pera, nearly $5,000,000 change hands here every day.

The most famous bazaars, however, were built by Sultan Bayazid II between the second and third hills of Stamboul and cover several acres of ground. There are 4,000 shops and a hundred entrances in the great stone building. It may look like a fortress from without, but once inside it becomes a noisy, multicolored labyrinth of streets, columns, squares, and fountains, under an arched roof.

Here, amid a babel of all languages, rich merchants and ragged refugees alike are solicited to buy soft rugs from Bokhara, gay Brusa silks, blazing jewels of odd cut, shawls from Persia, yellow and black amber, intoxicating perfumes, coffee-cups of beaten gold, pearls like milk and roses, sewing-machines, egg-beaters, granite pans, and old Turkish costumes, which the shopkeeper tries to sell as kimonos.

Few buyers are in the bazaars these days, for the time has passed when a pasha could afford to send his whole harem shopping under the eye and whip of the head eunuch. The bazaars have come upon hard times. The American tourist is barred because of the war between Turkey and Greece, and the soldiers and refugees turn out their pockets and laugh when they are exhorted to buy.

The white marble palaces which line the Bosporus are no longer used by sultans, pashas, and beys. They are in a sad state of dilapidation, and some of them are occupied by French and Hindustani troops, or by Allied officials.

The Sultan lives in seclusion at Yildiz Palace. In pathetic contrast with the splendor and pomp that used to attend his weekly visit to some city mosque is the shabby parade that now marks his drive to prayers each week at Yildiz mosque, perhaps two hundred feet from his palace door. A few visitors still collect in the waiting-rooms of the palace to see him go by, staring through the windows at the short line of cavalry, the straggling band, and the few foot soldiers, in uniforms of Teutonic cut, who assemble to salute their ruler with methodical cheers.

Perhaps nothing is so typical of the change that has come to Turkey as the contrast between the ceremony of old and the present sad function. The furnishings of the room facing the terrace, where princes and potentates have waited in the past, breathless at the luxury surrounding them, are now worn and shabby. French furniture sags on legs from which the gilt has been rubbed. A black stovepipe attached to a tile stove mars a corner. A Turkish admiral in white linen and a young officer, the only governmental representatives present, were the only visitors to be served coffee. When the Sultan drove by at last, saluting from his victoria, he saw only a handful of troops where his predecessors had proudly ignored men who packed the roadway with their pennant lances.

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JANUARY, 1922

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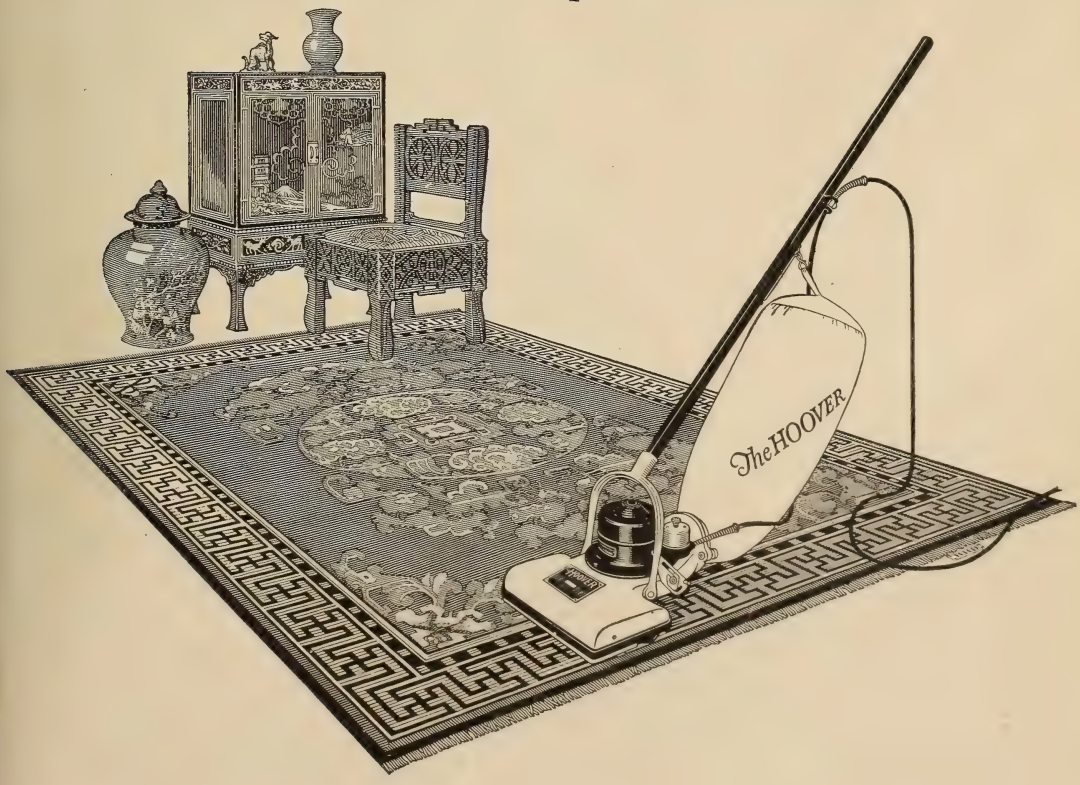

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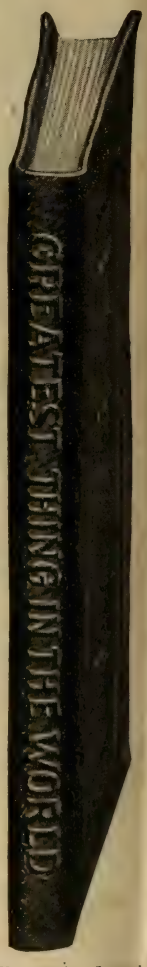

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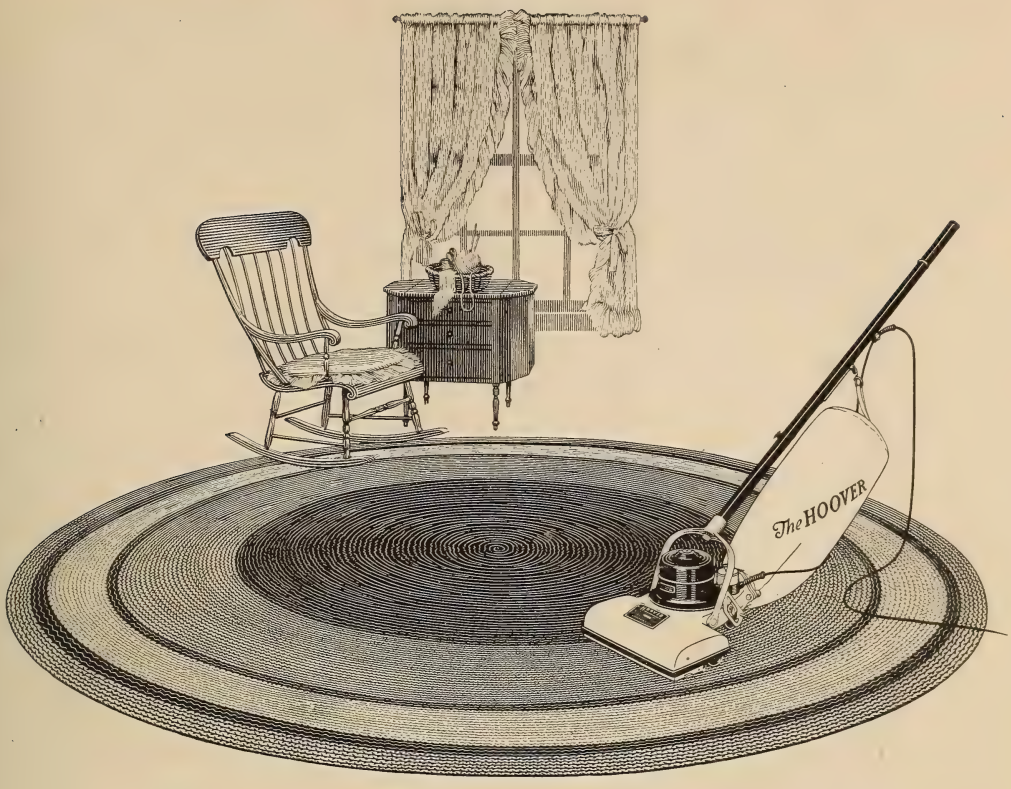

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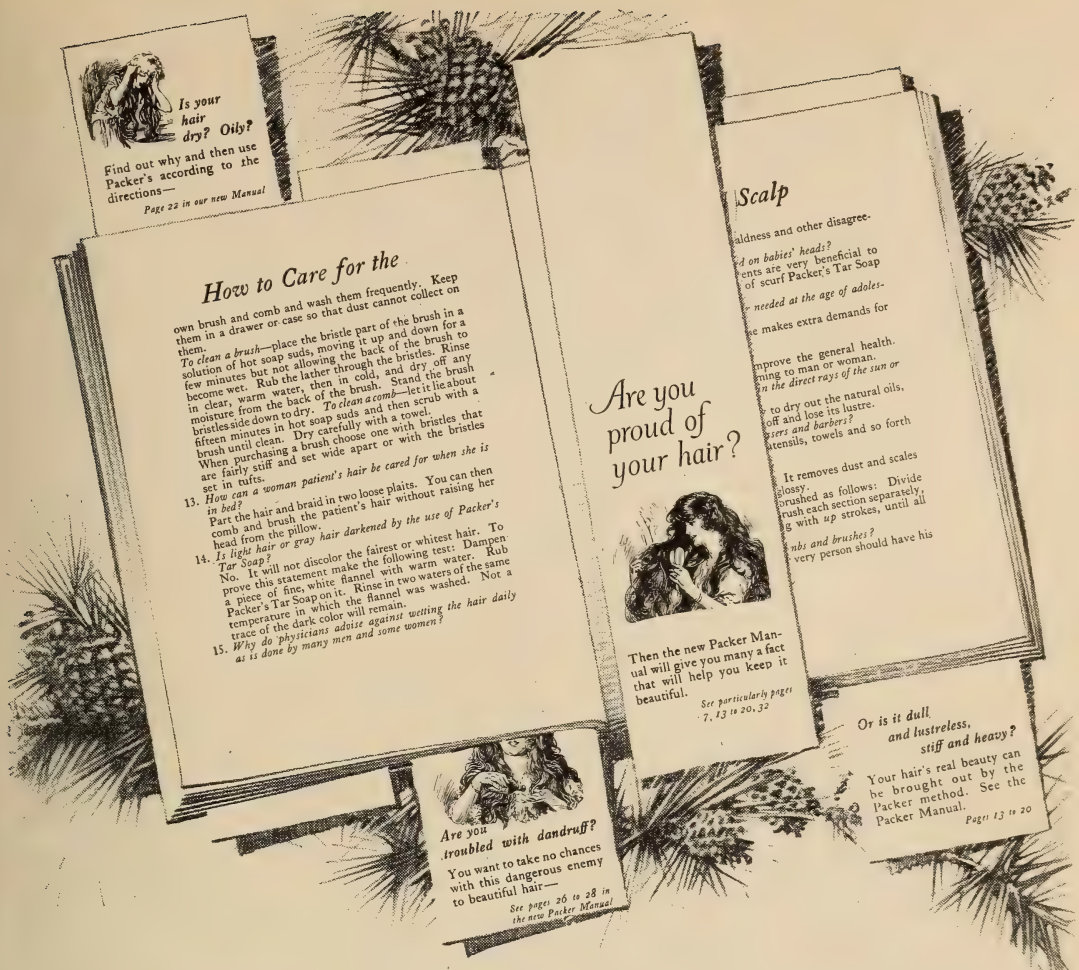
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VOLUME XLI NUMBER FIVE

THE NATIONAL GEOGRAPHIC MAGAZINE

MAY, 1922

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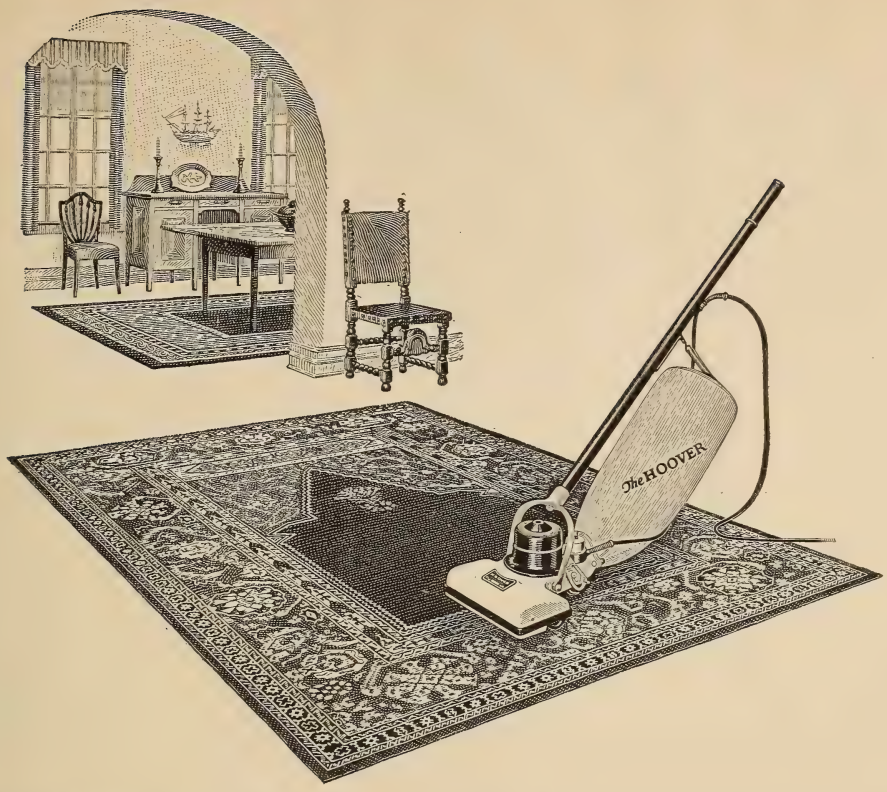

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ONE often hears travelers assert that the average European is more cultured and more widely read than the average American; that the American seems to prefer lurid fiction, sensational newspapers. Is this really true?

No doubt this impression has been created by the fact that in Europe all of the great classics of literature can be obtained in very low-priced editions, and have always been sold by the hundreds of thousands. This has never been true in this country—until within the last few years.

Yet, like magazines or newspapers, it has always been possible to produce well-bound and well-printed books for a small sum, if some one dared to risk printing in enormous editions. But no one has ever dared to risk this. A few years ago, however, a group of young men decided to rush in where more cautious publishers had always feared to tread.

How a Faith Was Justified

These young men elected to publish many of the greatest masterpieces of the world's literature. The editions of these books ran as high as 1,000,000 volumes at a time, and because of the resulting economies, were offered to the public at a price that even the poorest could afford. Was this faith in the literary taste of the American public justified? Would Americans really buy the best books in such unheard-of quantities?

The answer is "YES"—and we hope it rings loud enough to give an everlasting lie to the intellectual snobs who are always bewailing the fact that America is a land of "Main Street yokels," that we are essentially an illiterate people and that we have no taste for the best in literature.

The sale of Little Leather Library volumes—for that is the name of the series referred to—has been almost beyond belief. *In the last eighteen months alone over TEN MILLION of these books have been purchased.* And what were these "best sellers" that the American public craved so intensely? They were the best works of—Shakespeare, Browning, Burns, Coleridge, Macaulay, Tennyson, Longfellow, de Maupassant, Wilde, Poe, Emerson, Thoreau, Lincoln, Stevenson, and other similarly great masters!

Today you will see these books on the library tables of the wealthiest people in the land, and you will see them, too, in the homes of the humblest and poorest. And wherever you see them, you will know that in that home live people of unquestioned culture, whether they be rich or poor. For, clearly, they love good books, and what more can be said of a man?

What Some People Guessed

The publishers are still offering to sell thirty of these great works for the sum of $2.98. The illustration above shows the set in reduced size. They are books that no one cares to confess he has not read and re-read. They are complete as written, every one of them. This is not that abomination, a collection of "extracts." Their beauty and character you may judge from this fact: A large number of book-lovers were shown a sample, without being told what the price was, and *estimated that this set of thirty books was worth from $50 to $100.* These estimates are on file for the inspection of any one interested.

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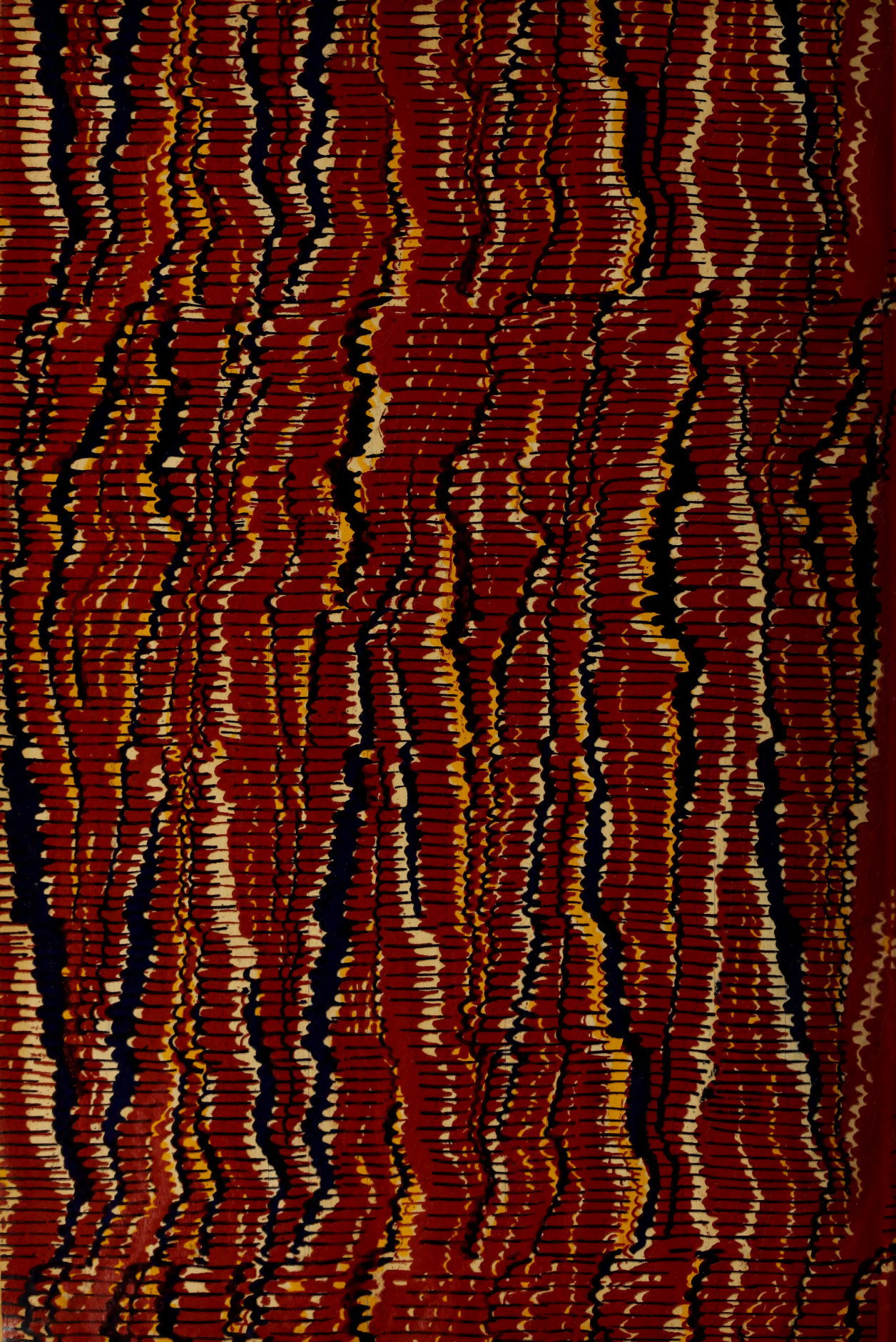

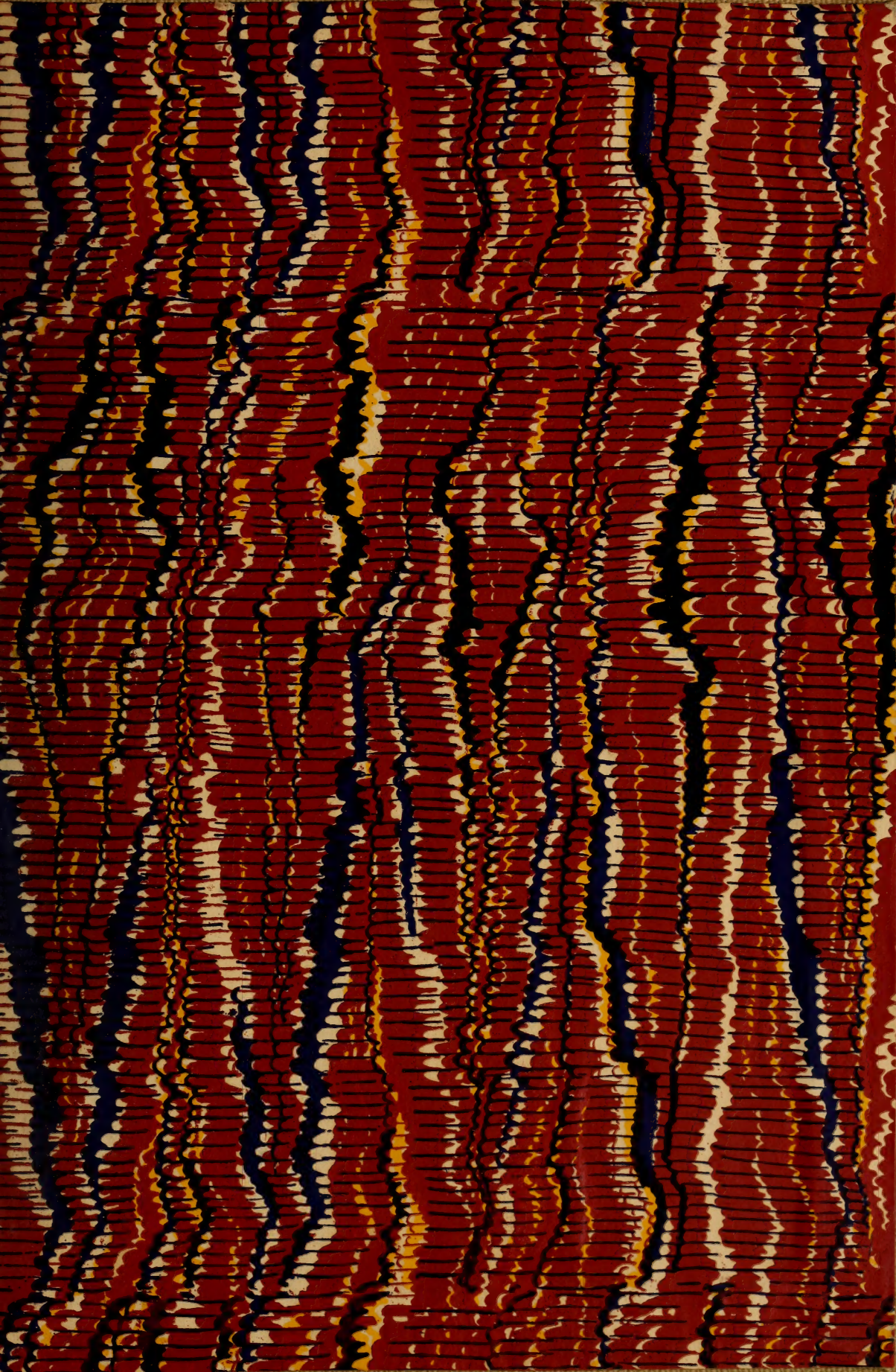

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